NUSA TENGGARA TIMUR: The Challenges of Development

A selection of papers from two meetings to discuss the socio-economic development of Nusa Tenggara Timur, Canberra, September 1989, and Kupang, November 1989

Editors

Colin Barlow
Alex Bellis
Kate Andrews

Dept of Political and Social Change
Research School of Pacific Studies
The Australian National University, Canberra, 1991
Contents

LIST OF TABLES .............................................................................................................. v
LIST OF FIGURES .......................................................................................................... vii
GLOSSARY ................................................................................................................... viii
NOTES ON CONTRIBUTORS ........................................................................................ xvi
ACKNOWLEDGEMENTS ................................................................................................. xix

CHAPTERS:

1 Introduction ................................................................................................................. 1
   Colin Barlow, Alex Bellis

2 Opening Address
   The Hon. H. Fernandez, Governor of Nusa Tenggara Timur .......................... 7

Background

3 Socio-economic Features and Potentials ................................................. 15
   Colin Barlow, Ria Gondowarsito

4 Land and Environment in NTT ................................................................. 31
   Kate Duggan

5 Health, Education and Social Services in NTT: Social
   Development in a Poor Province ............................................................. 39
   Lorraine Corner

Regional Development Issues

6 Approaches to Regional Development in Indonesia and the
   NTT ......................................................................................................................... 53
   Manuwoto

7 Regional Policy in NTT ....................................................................................... 63
   Godlief Boeky, SH
   Deputy Governor of Nusa Tenggara Timur

8 A Case Study of Development
   in the Province of West Sumatra .............................................................. 73
   Harun Zain

9 Livestock Development in NTT ................................................................. 85
   Robert Ayre-Smith
Contents

10 New Forage Technologies .................................................. 105
   Colin Piggin

11 Food Crops Development in NTT ...................................... 121
   Ch. Pellokila, Simon Field, E.O. Momuat

12 Industry in NTT ............................................................ 145
   Konrad Purba

13 The Role of Tourism in NTT Development ......................... 155
   Umbu Peku Djawang

14 Markets in Central Timor ............................................... 165
   Anthony Forge

Development Programmes: Planning Approaches
and Implementation

15 The Implementation of Regional Development Programmes
(PPW) in NTT ................................................................. 181
   Piet Djemarut

16 The Role of LSM/LPSM (NGOs) ....................................... 195
   M.S.O. Fernandez

17 The NTTIADP and NTASP Schemes .................................. 201
   Don Moffat

18 AIDAB's Approach to NTT Development ............................. 215
   Peter Charlton

19 Tentative Routes Towards the Development of NTT ................. 223
   Hendrik Ataupah

20 Conclusions and Recommendations ................................... 231
   Colin Barlow

APPENDICES

I Supplementary Tables .................................................... 242

II Summarized Recommendations from Individual Chapters . 264

III Prioritized Recommendations ....................................... 272

REFERENCES ......................................................................... 278

INDEX .................................................................................. 289
LIST OF TABLES

6.1 Typology of economic development ........................................... 55
6.2 Typology of development of health conditions ......................... 56
6.3 Typology of development of education conditions ..................... 57
6.4 Typology of development of poverty levels .................................. 58
9.1 Livestock resources NTT, 1987 ............................................. 91
9.2 Livestock distribution, NTT ................................................. 91
9.3 Ownership distribution: cattle and buffalo, NTT
(hypothetical recent situation) .................................................. 92
10.1 Effects of improved pastures on liveweight gain ....................... 106
10.2 Production of cattle in NTT, 1978 to 1987 ('000) ...................... 108
11.1 Regional Gross Domestic Product and per capita income, NTT, 1979–87 ................................................................. 122
11.2 Returns from cropping patterns for upland fields,
Kabupaten Kupang, 1988/89 wet season ........................................ 136
12.1 Industry in NTT, first semester, 1989 ..................................... 147
12.2 The status of industry in NTT, 1988 ....................................... 147
12.3 Industrial development potentials in NTT .................................. 151
13.2 Tourist facilities and Tourism Training in NTT, 1989 ................. 159
14.1A Details of sellers in TTS markets, June and July 1989
(Market Survey) ................................................................. 168
14B Details of sellers in TTU markets, June and July 1989
(Market Survey) ................................................................. 168
14.2 Papalele operations, TTU only, capital employed and
average return, sorted by percentage return ............................... 170
14.3 Kefa and Soe markets stratified by villagers'
expected return ........................................................................ 173
14.4 Principal purchases of sellers at four kecamatan markets.
Percentages of most frequently purchased goods (minor
purchases not recorded) ......................................................... 174
18.1 Australian aid activities in NTT .............................................. 217
Supplementary Tables (Appendix I):

1  Economic and social performances in NTT and all Indonesia, 1980s .......................................................... 242
2  Composition of RGDP, NTT, 1975–86 (%) ....................... 243
3  Annual increases of RGDP (at constant 1986 prices), NTT, 1975–86 (per cent over previous years) .................. 244
4  Composition of agriculture’s contribution to RGDP, NTT, 1975–86 (%) ...................................................... 245
5  Local agriculture and fishing, NTT, 1987 ....................... 246-248
6  Harvested areas and production of major food crops, NTT, 1975–87 ............................................................. 249
7  Planted areas and production of major tree crops, NTT, 1975–87 .................................................................. 250
8  Livestock numbers and slaughterings, NTT, 1975–87 ................................................................................ 251
9  Fish and forestry production, NTT, 1975–87 ................. 251
10 Aspects of small farm agriculture by kabupaten, NTT, 1983 ............................................................... 252-253
11 Farm size distribution by type of farming, NTT, 1983 ........................................................................ 254
13 Farm size distribution by area of land controlled and ownership, NTT, 1983 ............................................. 257
14 Distribution of monthly household income, NTT, 1987 (%) .................................................................... 258
15 Annual consumption of major foods, per head, NTT, 1987. ....................................................................... 2558
16 Details of industrial enterprises, NTT, 1986 ................. 259
17 International exports, NTT, 1975–87 ................................ 260
18 Exports and imports, NTT, 1987 (Rp million) .............. 260
19 Infrastructures in NTT, 1975–87 ..................................... 261
20 Government receipts and expenditures, NTT, 1979/80—1986/87 (Rp billion) ............................................ 262–263
LIST OF FIGURES

1.1 Towns, *kabupaten* and roads of Nusa Tenggara Timur .... 2
3.1 Topography of NTT .......................................................... 16
3.2 Rivers of NTT ...................................................................... 18
3.3 Indices of major prices, NTT, 1970–87 ............................. 19
10.1 Effects of improved pastures on livestock weight gains, Northern Australia, 1970–79 ........................................... 107
11.1 Rice yields under three planting systems, Naibonat, NTT, 1986/87–1988/89 ..................................................... 138
14.1 Garlic prices, TTU and TTS, 1988/89 ............................ 176
14.2 Tomato prices, TTU and TTS, 1988/89 ........................... 176
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AARD</td>
<td>The Agency for Agricultural Research and Development [An Indonesian national group involved in all kinds of agricultural research and commonly referred to as Litbang Pertanian or Badan Penelitian dan Pengembangan Pertanian]</td>
</tr>
<tr>
<td>Abon</td>
<td>Cured shredded meat</td>
</tr>
<tr>
<td>ABRI</td>
<td>Angkatan Bersenjata Republik Indonesia [Indonesian Armed Forces]</td>
</tr>
<tr>
<td>ACB</td>
<td>Activity Cycle Booklet [an internal AIDAB document]</td>
</tr>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
</tr>
<tr>
<td>AIDAB</td>
<td>The Australian International Development Assistance Bureau</td>
</tr>
<tr>
<td>Ampupu</td>
<td>Eucalyptus</td>
</tr>
<tr>
<td>Anthesis</td>
<td>Time at which the maize plant flowers are blooming</td>
</tr>
<tr>
<td>ANU</td>
<td>The Australian National University</td>
</tr>
<tr>
<td>APBD</td>
<td>Anggaran Pendapatan dan Belanja Daerah [local government budget]</td>
</tr>
<tr>
<td>APBN</td>
<td>Anggaran Pendapatan dan Belanja Negara [national budget]</td>
</tr>
<tr>
<td>APPKD</td>
<td>Anggaran Proyek Pembangunan Keperluan Daerah [Budget for Regional Needs Development Projects]</td>
</tr>
<tr>
<td>Asam</td>
<td>Tamarind</td>
</tr>
<tr>
<td>ASEAN</td>
<td>Association of Southeast Asian Nations</td>
</tr>
<tr>
<td>ATBM</td>
<td>Alat Tenun Bukan Mesin [non-mechanized weaving looms]</td>
</tr>
<tr>
<td>Atoni Pah Meto</td>
<td>People with dryland culture</td>
</tr>
<tr>
<td>Bahasa Dawan</td>
<td>A local language of Central Timor</td>
</tr>
<tr>
<td>Bahasa Indonesia</td>
<td>The Indonesian national language</td>
</tr>
<tr>
<td>Bambu</td>
<td>Bamboo</td>
</tr>
<tr>
<td>Bangda Pembangunan Daerah</td>
<td>The district development agency responsible to the Ministry of the Interior</td>
</tr>
</tbody>
</table>
Bangdes Pembangunan [The village] Development Directorate-General of Desa the Ministry of the Interior

Bank Pembangunan Daerah Regional Development Bank

Banpres Bantuan Presiden [direct aid given by the president]

Bantuan Luar Negeri Foreign aid

Bappeda Badan Perencanaan Pembangunan Daerah [the planning arm of the provincial government. Bappeda proposes provincial development plans and monitors the running of existing projects.]

Bappenas Badan Perencanaan Pembangunan Nasional [The National Planning Board]

Bebas tantra 'Free from higher-level bureaucratic interference'

Bemo A small vehicle used for public transport

b.e.p Break-even point

Bimas Bimbingan massal [agricultural extension programme for all crops. The Bimas coordinates the advisory activities of the various Dinas involved in agriculture.]

BKPM Badan Koordinasi Penanaman Modal [Investment Coordinating Board]

BLN Bantuan Luar Negeri [foreign aid]

BPS Biro Pusat Statistik [Central Bureau of Statistics]

Buku putih Exercise books

Bupati Head of second-level district (kabupaten)

Camat Head of second-level district (kecamatan)

Cendikiawan or Cerdik pandai Intellectuals or educated class

Centre The central government in Jakarta [referred to as the Pusat in Indonesian]

CIDA The Canadian International Development Agency

Coklat/kakao Chocolate/cocoa

Daerah District, but with no administrative connotation

Daftar Isian Proyek Register of Approved Development Projects
**Glossary**

**Dendeng**  | Dried shredded meat
---|---
**Departemen Pekerjaan Umum**  | Department of Public Works
**Desa**  | Village
**Determinate crops**  | Crops which set seed after a finite period. Indeterminate crops are those which will keep flowering and producing seed, provided climatic conditions are suitable.
**DI**  | Daerah Ibukota [capital district]
**Dinas Kehutanan**  | The Forestry Office
**Dinas Kesehatan**  | The Health Office and Advisory Service
**Dinas Perkebunan**  | The Tree Crops Office [sometimes termed Dinas Tanaman Pangan]
**Dinas Pertanian**  | The Food Crops Office
**Dinas Peternakan**  | The Livestock Office
**Dinas**  | Provincial office
**DIPDA**  | Daftar Isian Proyek Daerah [Register of Approved Development Projects under the local government budget, sometimes called a ‘DIP’ by expatriates]
**DKI**  | Daerah Khusus Ibukota [special capital district]
**DM**  | Dry Matter
**DUPDA**  | Daftar Usulan Proyek Daerah [Register of Proposed Development Projects under the local government budget, sometimes called a ‘DUP’ by expatriates]
**ESCAP**  | Economic and Social Commission for Asia and the Pacific
**FSR and D**  | Farming Systems Research and Development
**G30S**  | Gerakan 30 September [Coup of 30 September 1955]
**Garam industri**  | Salt produced by industry
**Garam rakyat**  | Salt produced by ordinary people
**GBHN**  | Garis Garis Besar Haluan Negara [Broad Guide lines to State Policy]
**GDP**  | Gross Domestic Product—the total output of goods and services, for final use within the designated area.
Glossary

(in this case, NTT), produced by residents and non-residents and valued at factor prices.

GEMPAR  *Gerakan Meningkatkan Pendapatan Asli Rakyat* [movement to raise the incomes of local people]

GNP  Gross National Product. GDP (as defined above) *plus* net factor income from outside the designated area. This net factor income is the income residents receive from outside the designated area for factor services (e.g. labour and capital) *less* similar payments made to non-residents who contributed to the economy of the designated area.

GOA  Government of Australia

*Gogorencah*  System of early rice planting, involving land cultivation before the beginning of the wet season

GOI  Government of Indonesia

*Gotong royong*  Community cooperation

GTZ  *Deutsche Gesellschaft für Technische Zusammenarbeit* [German Society for Technical Cooperation]

*Gula merah*  Brown sugar

*Gula semut*  Crystallized sugar

*Hankamnas*  *Pertahanan Amenan Nasional* [National Defence and Security Establishment]

*Heteropogon contortus*  Spear grass

HMT  High-yielding (planting) material

HRD  Human resource development

IAD  Integrated area development

IBRD  International Bank for Reconstruction and Development

IGGI  Inter-Governmental Group on Aid to Indonesia

*Ijon*  Pre-harvest credit

*Ikan cakalang*  Skipjack

*Ikat*  Traditional form of handloom weaving of dyed cloth, usually undertaken by women

IMF  International Monetary Fund

Indeterminate crops  [See definition under ‘Determinate crops’.]
<table>
<thead>
<tr>
<th>Term</th>
<th>Glossary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inmendagri</td>
<td><em>Instruksi Menteri Dalam Negeri</em> [Interior Minister’s Instruction]</td>
</tr>
<tr>
<td>Inpres</td>
<td><em>Instruksi President</em> [(Direct development grant given under ‘presidential instruction’)]</td>
</tr>
<tr>
<td>Inter-island markets</td>
<td>Indonesian markets outside NTT</td>
</tr>
<tr>
<td>Kabupaten</td>
<td>The chief administrative sub-unit within the province. In Dutch colonial times, the <em>kabupaten</em> were called ‘regencies’.</td>
</tr>
<tr>
<td>Kadin</td>
<td><em>Kamar Dagang dan Industri</em> [Chamber of Commerce and Industry]</td>
</tr>
<tr>
<td>Kaki lima</td>
<td>Sidewalk vendors</td>
</tr>
<tr>
<td>Kanwil</td>
<td><em>Kantor Wilayah</em> [Head of the Regional Office (of the appropriate service)]</td>
</tr>
<tr>
<td>Kanwil Pertanian</td>
<td>The Regional Office for agriculture</td>
</tr>
<tr>
<td>Kerang-kerangan</td>
<td>Molluscs</td>
</tr>
<tr>
<td>Komodo</td>
<td>A giant lizard or ‘dragon’, which lives on Komodo Island off western Flores (see Figure 1.1)</td>
</tr>
<tr>
<td>Kintal</td>
<td>House garden</td>
</tr>
<tr>
<td>Kios</td>
<td>Stalls used for selling within a market</td>
</tr>
<tr>
<td>KKN</td>
<td><em>Kuliah Kerja Nyata</em> [process of students (mainly from town) going to the villages to gain experience]</td>
</tr>
<tr>
<td>Kupedes</td>
<td><em>Kredit Umum Pedesan</em> [official systems of general credit available at the village level]</td>
</tr>
<tr>
<td>Kupedes</td>
<td><em>Kredit Umum Pedesa</em> [village cooperative supported by the government]</td>
</tr>
<tr>
<td>Kud</td>
<td>Koperasi Unit Desa [village cooperative supported by the government]</td>
</tr>
<tr>
<td>Kwie</td>
<td>Kwartir Wilayah (of the appropriate service)</td>
</tr>
<tr>
<td>Keda</td>
<td>Kecamatan (of a kabupaten)</td>
</tr>
<tr>
<td>Keda</td>
<td>Subdistrict (of a kabupaten)</td>
</tr>
<tr>
<td>Keda</td>
<td>Abbreviation for the town of Kefamenanu, TTU</td>
</tr>
<tr>
<td>Kabupaten</td>
<td>The chief administrative sub-unit within the province. In Dutch colonial times, the <em>kabupaten</em> were called ‘regencies’.</td>
</tr>
<tr>
<td>Kabupaten</td>
<td>The chief administrative sub-unit within the province. In Dutch colonial times, the <em>kabupaten</em> were called ‘regencies’.</td>
</tr>
<tr>
<td>Kabupaten</td>
<td>The chief administrative sub-unit within the province. In Dutch colonial times, the <em>kabupaten</em> were called ‘regencies’.</td>
</tr>
<tr>
<td>Kabupaten</td>
<td>The chief administrative sub-unit within the province. In Dutch colonial times, the <em>kabupaten</em> were called ‘regencies’.</td>
</tr>
<tr>
<td>Kabupaten</td>
<td>The chief administrative sub-unit within the province. In Dutch colonial times, the <em>kabupaten</em> were called ‘regencies’.</td>
</tr>
<tr>
<td>Kabupaten</td>
<td>The chief administrative sub-unit within the province. In Dutch colonial times, the <em>kabupaten</em> were called ‘regencies’.</td>
</tr>
<tr>
<td>Kabupaten</td>
<td>The chief administrative sub-unit within the province. In Dutch colonial times, the <em>kabupaten</em> were called ‘regencies’.</td>
</tr>
<tr>
<td>Kabupaten</td>
<td>The chief administrative sub-unit within the province. In Dutch colonial times, the <em>kabupaten</em> were called ‘regencies’.</td>
</tr>
<tr>
<td>Kabupaten</td>
<td>The chief administrative sub-unit within the province. In Dutch colonial times, the <em>kabupaten</em> were called ‘regencies’.</td>
</tr>
<tr>
<td>Kabupaten</td>
<td>The chief administrative sub-unit within the province. In Dutch colonial times, the <em>kabupaten</em> were called ‘regencies’.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Kadang</strong></td>
<td>A clearing for cultivation in the shifting agriculture system. This is usually fenced off from livestock.</td>
</tr>
<tr>
<td><strong>Kampung</strong></td>
<td>A small village</td>
</tr>
<tr>
<td><strong>Lamtoro</strong></td>
<td>A fast-growing tree whose leaves are used for forage, and its wood for fuel</td>
</tr>
<tr>
<td><strong>Line</strong></td>
<td>A sub-type of a particular crop variety</td>
</tr>
<tr>
<td><strong>LK</strong></td>
<td><em>Laporan Kegiatan</em> [report on activities]</td>
</tr>
<tr>
<td><strong>LKMD</strong></td>
<td><em>Lembaga Ketahanan Masyarakat Desa</em> [village council]</td>
</tr>
<tr>
<td><strong>Lontar</strong></td>
<td>A local palm tree of NTT producing carbohydrate water, wine, sugar and thatching material, and especially cultivated by the Rotinese</td>
</tr>
<tr>
<td><strong>LPSM</strong></td>
<td><em>Lembaga Pembina Swadaya Masyarakat</em> [see ‘LSM’]</td>
</tr>
<tr>
<td><strong>LSM</strong></td>
<td><em>Lembaga Swadaya Masyarakat</em> [non-government organizations aimed at fostering self-help abilities at the community level]</td>
</tr>
<tr>
<td><strong>Manunggal Sakato</strong></td>
<td>A development approach which entails sharing the heavy and light burdens equally</td>
</tr>
<tr>
<td><strong>Meo Besi</strong></td>
<td>Hero with qualities of iron and steel</td>
</tr>
<tr>
<td><strong>Meo Pa’e</strong></td>
<td>Fortuitous hero</td>
</tr>
<tr>
<td><strong>Minyak kayu putih</strong></td>
<td>Melaleuca oil</td>
</tr>
<tr>
<td><strong>MIS</strong></td>
<td>Management information system</td>
</tr>
<tr>
<td><strong>MOU</strong></td>
<td>Memorandum of Understanding</td>
</tr>
<tr>
<td><strong>MPR—RI</strong></td>
<td><em>Majlis Permusyawaratan Rakyat—Republic Indonesia</em> [People’s Consultative Assembly of the Republic of Indonesia]</td>
</tr>
<tr>
<td><strong>MSG</strong></td>
<td>Monosodium glutamate, a flavouring ingredient in food</td>
</tr>
<tr>
<td><strong>MTR</strong></td>
<td>Mid-Term Review</td>
</tr>
<tr>
<td><strong>Multiple cropping</strong></td>
<td>The growing of several crops in the same area of land. This may entail intercropping, relay cropping (where crops succeed one another with overlaps), and sequential cropping (where one crop follows immediately after another).</td>
</tr>
<tr>
<td><strong>NAEP III</strong></td>
<td>National Agricultural; Extension Project, phase III [World Bank and AIDAB project]</td>
</tr>
</tbody>
</table>
NGO Non-government organization [see LSM]
NTAADP Nusa Tenggara Accelerated Agriculture Development Project [ADB project]
NTASP Nusa Tenggara Agricultural Support Project [World Bank and AIDAB project]
NTT Nusa Tenggara Timur [East Nusa Tenggara]
NTTIADP Nusa Tenggara Timur Integrated Agriculture Development Project Area [AIDAB project]
NTTLDP Nusa Tenggara Timur Livestock Development Project [AIDAB project]
Nuclear estate A big commercial operation helping the small farmers or fisher persons who surround it with technical, processing, managerial and marketing services (see also 'PIR')

*Nymphula depunctalis* Caseworm or caterpillar which eats paddy foliage

*Palawija* Non-rice annual food crops, especially maize, legumes, vegetables, cassava and sweet potato.

*Pancasila* [Lit.: ‘Five Principles’] State philosophy originally formulated by President Sukarno in 1945

*Papalele* Timorese small ‘wholesalers’ who buy in modest quantities for resale

PDB *Produk Domestik Bruto* [Gross Domestic Product (see definition under RGDP below)]

PDP Provincial Area Development Project [USAID project]

PDRB *Produk Domestik Regional Bruto* [Regional Gross Domestic Product (see definition under RGDP below)]

*Pegawai* Government official

*Pelita* *Pembangan Lima Tahun* [Five-Year Plan (see also *Repelita*)]

*Pembangunan* Development

*Pemda* *Pemerintah daerah* [the regional (here understood as ‘provincial’) government]

*Pengairan* Water supplies

*Pertenunan* Weaving

*Peternakan* Livestock
<table>
<thead>
<tr>
<th><strong>Glossary</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pewilayan Pertanian</strong></td>
<td>Agro-ecosystems</td>
</tr>
<tr>
<td><strong>PHPA</strong></td>
<td><em>Kanwil Departemen Kehutanan Propinsi NTT</em> [Regional Coordinating Office of the Forest Department]</td>
</tr>
<tr>
<td><strong>PHRI</strong></td>
<td><em>Perhimpunan Hotel dan Restoran Indonesia</em> [Indonesian Restaurant and Hotel Association]</td>
</tr>
<tr>
<td><strong>Pimpro</strong></td>
<td><em>Pimpinan Proyek</em> [Project leader]</td>
</tr>
<tr>
<td><strong>Pinang</strong></td>
<td>Betel nut</td>
</tr>
<tr>
<td><strong>PIR</strong></td>
<td><em>Perusahaan Inti Rakyat</em> [a ‘nucleus estate' (see above)]</td>
</tr>
<tr>
<td><strong>PIU</strong></td>
<td>Project Implementation Unit</td>
</tr>
<tr>
<td><strong>PKI</strong></td>
<td><em>Parti Kommunis Indonesia</em> [Indonesian Communist Party]</td>
</tr>
<tr>
<td><strong>PKK</strong></td>
<td><em>Pembinaan Kesejahteraan Keluarga</em> [government-sponsored institution entrusted with guiding family welfare at the village level]</td>
</tr>
<tr>
<td><strong>PMU</strong></td>
<td>Project Management Unit</td>
</tr>
<tr>
<td><strong>Poverty line</strong></td>
<td>A standard of living defined by nutritional consumption, and below which people are regarded as ‘living in poverty’.</td>
</tr>
<tr>
<td><strong>PPIPD</strong></td>
<td><em>Proyek Penyiapan Investasi Pembangunan di Daerah NIT dan NIT</em> [Project to prepare for Investment in Development in West and East Nusa Tenggara]</td>
</tr>
<tr>
<td><strong>PPW</strong></td>
<td><em>Program Pengembangan Wilayah</em> [regional development programme]</td>
</tr>
<tr>
<td><strong>PRRI</strong></td>
<td><em>Pemerintah Revolusioner Republik Indonesia</em> [Revolutionary Government of the Republic of Indonesia, which was proclaimed in 1958 in West Sumatra to challenge the central government under President Sukarno]</td>
</tr>
<tr>
<td><strong>PT Pusri</strong></td>
<td><em>Perseroan Terbata Pupuk Sriwijaya</em> [a state-owned limited liability fertilizer-producing company in Palembang, South Sumatra]</td>
</tr>
<tr>
<td><strong>PU</strong></td>
<td><em>Pekerjaan Umum</em> [Department of Public Works]</td>
</tr>
<tr>
<td><strong>Puskesmas</strong></td>
<td><em>Pusat kesehatan masyarakat</em> [people's health centre]</td>
</tr>
<tr>
<td><strong>Pu'un</strong></td>
<td>A cluster of small trees</td>
</tr>
</tbody>
</table>
**Putri**  
*Perhimpungan Usaha Taman Rekreasi*  
[Regional Commission of the Association of Recreation Parks]

**Rakorban**  
*Rapat koordinasi pembangunan* [meeting to coordinate development (of a region)]

**Rapat adat**  
A meeting to discuss tradition (i.e. customary) affairs

**RAVC**  
Return Above Variable Cost

**Relay cropping**  
[See ‘Multiple cropping’]

**Repelita**  
*Rencana Pembangunan Lima Tahun* [national five-year development plan]

**RGDP**  
Regional Gross Domestic Product—the total value of GDP from the area (in this case, NTT)

**Sawah**  
Rice grown with the aid of flooding by water, in rice ‘paddies’ surrounded by bunds. It contrasts with ‘dry’ rice cultivation whereby there is no flooding or bunds, and whereby rice is grown on sloping ground.

**Sayogyo**  
An Indonesian sociologist from the Bogor Agricultural University, who derived a much-used poverty line

**Sequential cropping**  
[See ‘Multiple cropping’]

**Sirih catkins**  
Catkins used in conjunction with betel nut chewing

**SK**  
*Surat Keputusan* [government decree]

**SKP**  
*Sekolah Kepandaian Patri* [vocational school for girls]

**Sub Balai Penelitian**  
Subsidiary Research Station

**Sub Balai Reboissasi**  
Subsidiary office for rehabilitating land and conserving soil

**Lahan Dan Konservasi Tanah**

**SUP AS**  
*Survai Penduduk Antar Census* [Intercensal Population Survey, conducted by the Central Bureau of Statistics, or BPS]

**SUSENAS**  
*Survai Sosial Ekonomi Nasional* [National Socio-economic Sample Survey, conducted by the Central Bureau of Statistics]
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWP</td>
<td>Satuan Wilayah Pembangunan [Regional Development Unit]</td>
</tr>
<tr>
<td>T &amp; V</td>
<td>Training and Visit [system of extension]</td>
</tr>
<tr>
<td>Tanah ulayat</td>
<td>Land belonging to the general community</td>
</tr>
<tr>
<td>Tanaman pangan</td>
<td>Tree crops</td>
</tr>
<tr>
<td>Tigo tungku sejarangan</td>
<td>‘Doing three things at the same time’</td>
</tr>
<tr>
<td>Tim Tim</td>
<td>Timor Timur [East Timor Province]</td>
</tr>
<tr>
<td>TTS</td>
<td>Timor Tengah Selatan [South Central Timor (kabupaten)]</td>
</tr>
<tr>
<td>TTU</td>
<td>Timor Tengah Utara [North Central Timor (kabupaten)]</td>
</tr>
<tr>
<td>Udang</td>
<td>Prawn</td>
</tr>
<tr>
<td>UDKP</td>
<td>Unit Daerah Kerja Pembangunan [District Unit for Development Activities]</td>
</tr>
<tr>
<td>Ulama ninik mamak</td>
<td>Traditional leader</td>
</tr>
<tr>
<td>Undana</td>
<td>Nusa Cendana University, Kupang</td>
</tr>
<tr>
<td>Upland</td>
<td>Land not suitable for rainfed or irrigated rice</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
</tr>
<tr>
<td>VOC</td>
<td>Verenigde Dostindische Compagnie [Dutch East India Company]</td>
</tr>
<tr>
<td>Wali negeri</td>
<td>Customary head person</td>
</tr>
<tr>
<td>Warung</td>
<td>Small outdoor shop</td>
</tr>
</tbody>
</table>
CONTRIBUTORS

Dr Hendriks Ataupah, Department of Anthropology, Nusa Cendana University, Kupang

Mr Robert Ayre Smith, ACIL Australia Pty Ltd, Sydney

Dr Colin Barlow, Department of Economics, Research School of Pacific Studies, the Australian National University (ANU), Canberra

Ir Godlief Boeky, Deputy Governor of NTT

Mr Peter Charlton, Country Program Manager, Indonesia–Malaysia Section, Australia International Development Assistance Bureau, Canberra

Dr Lorraine Corner, National Centre for Development Studies, ANU, Canberra

Drs Piet Djemarut, Ketua Bappeda Tingkat I NTT, Kupang

Dr Kate Duggan, ACIL Australia Pty Ltd (Agricultural and economic consultants), Melbourne

Dr H. Fernandez, Governor of Nusa Tenggara Timur

Mr M.S.O. Fernandez, Ketua BK3S, Kupang

Dr Simon Field, ACIL Australia Pty Ltd/Farming Systems Research, Nusa Tenggara Agricultural Support Project, Kupang

Professor Anthony Forge, Department of Prehistory and Anthropology, ANU, Canberra

Dr Ria Gondowarsito, Centre for Migration and Regional Studies, Mercu Buana University, Jakarta

Dr Ir Manuwoto, Bappenas, Jakarta

Mr Don Moffat, Director, ACIL Australia Pty Ltd, Melbourne

Dr E.O. Momuat, Litbang Pertanian/Farming Systems Research, Nusa Tenggara Agricultural Support Project, Kupang
Dr Umbu S. Peku Djawang, Kepala Dinas Pariwisata NTT, Kupang
Ir Ch Pellokila, Kepala Kawil Pertanian NTT, Kupang
Dr Colin Piggin, Director, Institute for Irrigation and Salinity Research, Tatura, Victoria
Drs Konrad Purba, Kepala Kanwil Perindustrian Propinsi NTT, Kupang
Prof. Harun Zain, Rector, Mercu Buana University, Jakarta

ACKNOWLEDGEMENTS

The editors of this volume are most indebted to those who provided the financial and other support which made the two meetings possible. These donors include the Provincial Government of Nusa Tenggara Timur, the Research School of Pacific Studies at the Australian National University, Canberra, the International Seminar Support Scheme of the Australian International Development Assistance Bureau, Canberra, the Centre for Migration and Regional Studies at Mercu Buana University, Jakarta, and several private Indonesians and Australians who wish to remain anonymous.

The editors also wish to thank the members of the organizing committees in Canberra and Kupang, who did so much to make both meetings a success.

They further want to acknowledge the help of all who contributed to the production of this volume, including Margaret Tyrie who did the wordprocessing; Idris Sulaiman who translated two papers from the conference in Kupang; Ahmad D. Habir who advised on some of the translations; Bev Fraser who typed additional material. They particularly appreciate the editorial help of Lulu Turner, who carefully rechecked all chapters and saw the manuscript through its final stages of production.
INTRODUCTION

Colin Barlow
Alex Bellis

This book on the social and economic development of Nusa Tenggara Timur (NTT) springs from an unusual cooperative venture, involving a team drawn from Mercu Buana University, Jakarta, the Australian National University, Canberra, and the NTT provincial government. The team worked in 1988 and 1989 to identify and then address problems facing development in NTT, and one of its 'products' was a report on what should be done: Development in Eastern Indonesia: The Case of Nusa Tenggara Timur. (Barlow et al 1990). The earlier versions of this report stimulated discussions at two meetings: an English-language workshop on 'The Economic and Social Development of Nusa Tenggara Timur' held in Canberra, Australia, from 2 to 3 September 1989, and an Indonesian language seminar on the same theme held in Kupang, Timor, from 7 to 10 November 1989. The present book includes a selection of papers—now incorporated as chapters—from both meetings.

The Canberra workshop involved foreign aid specialists, academics including anthropologists, economists, and environmental and agricultural scientists, Indonesian Embassy officials, private consultants, and students. The Kupang seminar involved representatives from both central and provincial governments, staff from line agencies, people from NGOs, and academics from Indonesian and Australian universities and research institutions. There were also various participants from the Northern Territory of Australia, including persons in business and government and a legislative assembly member representing the chief minister.

NTT, with its dry climate, weak communications and badly developed infrastructure, is one of the poorest parts of Indonesia. It certainly deserves attention to its problems from official quarters, which must predominantly involve the NTT provincial government with support from Jakarta. But Australia as a near neighbour (Kupang is only 800km from Darwin—see Figure 1.1) also has an interest. The fact that
Figure 1.1: Towns, kabupaten and roads of Nusa Tenggara Timur

Figure 1. Towns, Kabupaten and roads of Nusa Tenggara Timur

Note: Timor Barat = West Timor; Timor Timur = East Timor; Nusa Tenggara Timur (NTT) = East Nusa Tenggara; Nusa Tenggara Barat (NTB) = West Nusa Tenggara; the Indonesian province of NTT comprises West Timor, plus the islands of Flores and Sumba.
the climates of NTT and the Northern Territory are similar suggests that some useful transfer of technology might take place. In fact, this has already occurred to an extent through Australian government aid projects in the 1980s. There should, as well, be possibilities of raising the currently low level of NTT–NT trade, and the concept of Darwin as a ‘gateway to Australia’ has important relevance here.

This volume presents varying perspectives and approaches through chapters from contributors at different levels of government, business and academia. It aims to promote cross-disciplinary communication and a sharing of information, rather than provide an integrated singular perspective. While each paper has something unique to offer, the papers taken together provide a useful review of the main economic sectors in NTT, of key issues in developing these, and of the approaches to development currently being taken.

But despite the range of interests covered in this book, not all papers given at the two meetings are included. Thus most anthropological papers were not available for publication. Again, only some papers presented by departmental heads of the provincial government in Kupang could be included. As well, the views of NGO and business representatives, although fully canvassed in discussions, are not really reflected in these chapters. The key role of women in development is also not addressed. Fortunately, however, all papers delivered at the Kupang seminar are included in the companion Indonesian-language volume, *Pengembangan Potensi Sosial Ekonomi Nusa Tenggara Timur* [Potentials for Socio-Economic Development in Nusa Tenggara Timur] (Gondowarsito and Soendoro 1990).

**Order of chapters**

Following this introductory chapter, ‘The Opening Address’ of the Governor of NTT, Dr H. Fernandez, puts the all-important view of provincial government on challenges of development in NTT. Then in the BACKGROUND section of the book, there are chapters on the reigning economic and social conditions in the province and its potentials for development, on the difficult situation of the land and environment, and on problems in developing health, education and other social services.

Next in the section on REGIONAL DEVELOPMENT ISSUES, the view of the ‘centre’ in Jakarta is put first, succeeded by the views of the NTT regional government and by an account of experiences with regional development in the now more economically advanced province of West
Sumatra. Chapters by technical specialists then address the development of livestock, forages, food crops and industry. Local markets in Central Timor are also examined.

In the final section on Development Programmes, the large integrated rural improvement schemes run by Australia and other foreign donors are examined, and the much smaller but more community-based activities of the many non-government organizations in NTT are described. The specific operations of the Nusa Tenggara Timur Integrated Area Development Project (NTTIADP) run by Australia, and of the Nusa Tenggara Timur Agricultural Support Project (NTASP) administered by the World Bank, are analysed, and development programmes are then discussed from a sociological perspective. Finally, opinions expressed throughout the book are reviewed, and an attempt made to distil the chief thrust of recommendations.

There are also Appendices, including background data on the NTT economy, summarized recommendations from individual chapters, and 'prioritized recommendations' taken from the earlier report on Development in Eastern Indonesia cited above. There is a Glossary at the beginning of the book to help readers in understanding the many Indonesian terms, Indonesian and English acronyms, and abbreviations used.

A theme of interventions

The book is basically preoccupied with the role of 'external interventions', by government and other bodies, in assisting the processes of economic and social development. An assumption of almost all participants at the two meetings was that the peoples of NTT need help in the form of better technologies, advice, and improved physical and social infrastructures to realize potentials for improvement and growth. This assumption seems reasonable, and has been shown by past experiences in NTT and elsewhere to be a fundamental step to securing economic change. Interventions by government actually have a long history in NTT, and during this century have been associated with the progressive extensions of official authority over 'interior' areas and their opening to commerce (Ormeling 1955). Roads have been built, drainage and irrigation systems established, public health measures adopted, and new agricultural technologies such as Bali and Ongkole cattle (first tried in 1910) brought in. In more recent years infrastructure
improvements have been accelerated, and further techniques of cattle, forage and crop enhancement have been introduced.

Yet although these actions have often had positive effects on economic activity, NTT is still very poor, and much remains to be done in a situation where public resources are limited. Thus in the last decade especially, the government has enlisted the assistance of foreign donors in improving NTT through integrated development projects. The first substantial effort of this kind was the Provincial Area Development Project (PDP), which was launched with the United States' help in parts of West Timor and Flores (Figure 1.1) from the early 1980s. Then from the mid-1980s, the NTTIADP, which was financed with Australian aid, attempted to promote development in various parts of West Timor. Again the NTASP, supported by the World Bank, was a comprehensive improvement programme with a substantial research component in many parts of NTT as well as Nusa Tenggara Barat. Finally, the Asian Development Bank (ADB) in 1991 is only just beginning its sponsorship of irrigation schemes in selected areas, linked to local community development. These initiatives have all been quite substantial, and both they and the other continuing but broader-based activities of both regional and central governments are given much attention in the book.

Relevance and usefulness of the book

This volume helps in underscoring the extreme poverty and severe economic and social problems of Nusa Tenggara Timur which (together with Papua New Guinea) is the part of the developing world closest to Australia. NTT may thus be of special concern to those in Australia wishing to alleviate poverty in less privileged areas of the world, and has recently been indicated as such (Australian International Development Assistance Bureau 1991). NTT is certainly assigned special importance by the central Indonesian government, which now holds economic and social improvement in Eastern Indonesia to be vital in future national development.

On a general level, this book should be a useful source of information for Indonesian, Australian and other government bodies, for business people and consultants, and for politicians, academics and other specialists concerned with NTT. On a specific level, the evaluations and accommodations should be helpful in giving direction to areas for further development.
But while interventions by outsiders may be useful initial catalysts and stimulants to development, no one should expect them to be more than this. In the end, it must be the activities of local people, with their inborn abilities and internal dynamism, that lead to development. The discussions in this book suggest ways of encouraging the already substantial local initiatives, and it is hoped that these can become increasingly important to social and economic improvement in the 1990s.
First of all, expressing praise and thanks to God Almighty for all His mercy and blessings, allow me to welcome all the participants of the seminar to NTT.

Respected guests, as we know, the development effort represents a long-term process and its implementation is carried out in stages. Our achievements today represent the results of our previous steps, and what we do today will become the basis and foundation for development in the stages to follow.

From the point of view of development stages, *Repelita V*, which is the current phase, is an important and determining phase for the implementation of development to follow, because it represents the latest stage in the first 25 years of development. This means it is the last preparation stage before we enter the process of take-off in *Repelita VI*. One characteristic of the take-off process is an increasing growth of initiative, creativity and independence within society, which can be seen from the progressively more active role and participation of the people in development, including the development of the economy. This means that in future the role of society in socio-economic development will continue to grow.

Therefore, in relation to the matters I have just touched upon, this seminar is extremely timely and relevant with regard to the efforts already undertaken to reinforce our readiness for entering the take-off stage of *Repelita VI*. 

---

*Address of the Governor of NTT at the opening ceremony of the Seminar on Potentials for Socio-Economic Development in Nusa Tenggara Timur, 7 November 1989, at the official residence of the Governor in Kupang.*
The wheel of development turns continuously, and in front of us stretches the future of NTT, which still requires much attention. Therefore I will take this opportunity to paint a quick portrait of NTT at this moment. Although we are currently in the midst of difficult regional and national economic conditions we have managed to establish sufficiently strong foundations for development during Repelita VI, thanks to the efforts of government and all levels of society. At the end of Repelita IV, the annual growth rate of the NTT economy averaged 4.6 per cent, which was below the planned growth figure of an average 7 per cent per annum; and during Repelita V, based on the realization of the growth rate to date, the advance of the NTT economy would be 5 per cent per year.

Furthermore, the structure of the NTT economy is still unbalanced, whereby the contribution of the agricultural sector to regional income is still very large (recorded as 52 per cent at the end of Repelita IV); on the other hand the role of the modern sector is still not sufficiently prominent. The important contribution of the agricultural sector is indicated by the high level of absorption of labour in this sector: in 1985 it absorbed 77 per cent of the total labour force, and by the end of Repelita IV this had increased to 82 per cent. On the other hand, it is evident that there are increasing numbers of people entering the labour market but unable to find work because of a lack of employment opportunities.

At the end of Repelita IV, unemployment in NTT was 13.5 per cent of the total work force; that is around 205,433 people. This situation will swell again in Repelita V when unemployment is estimated to reach 27 per cent of the total work force, or 480,000 people. This will occur if we, both the government and society in general, do not make an effort to create new employment opportunities which can absorb additional numbers in the work force. If this situation is allowed to continue without serious efforts to control it, I am concerned that it will create social symptoms with a negative impact, which will be marked by an increase in crime statistics, in the form of hold-ups, robberies, etc. These in turn will hinder the paths of the wheels of government and development.

Also, the per capita income of our people is still considerably lower than the national figure, whereby at the end of Repelita IV the per capita income of NTT only reached Rp251,720 or approximately one-third of the national average. Along with this, the per capita income of
NTT farmers is far below the minimum physical requirement, set at around Rp151,700.

Equal distribution of wealth has indeed received priority in the implementation of Repelita IV. Speaking about equal distribution, another face of NTT flashes through our imagination: a face that represents a group in society with a low income, level of education, and standard of health; a group that has not yet been fortunate enough to enjoy the greater fruits of development. We must continue to exert ourselves from this moment onwards, and in the future, towards raising the income of the people of NTT, especially the low-income groups who often are not reached by the trickle-down effects of development. At the same time, we must continue to pursue increases in the production of basic foods.

Human resources are a determining factor in the success of development, and in this respect the quality of our people’s education and health needs to be improved, in order to bring it closer to the national level.

Natural resources are not used to an optimal level in the interests of development; and because of human practices, such as shifting cultivation methods and the system of slash-and-burn which do not take into account conservation of the environment, we see many instances of our natural resources and environment becoming degraded.

For this there needs to be a system of environmental management which is not simply oriented to exploiting natural resources, but also to conserving them. Faced with natural resources which are low in quantity and quality, technological adoption is needed; here lies the function of human beings as actors in development.

Repelita V is a very strategic period, because it represents the stage of development for reinforcing the foundations of the development framework for the take-off process which will begin in Repelita VI. We all realize that various regional development problems cannot be completely resolved in Repelita IV and need to be completed in Repelita V. This realization must underlie our assessment of the various potentials, conditions and problems which we face now and will face in the future.

The focus of Repelita V is on how to increase the income levels of people who have not yet enjoyed the results of development. Raising incomes does not only mean increasing the amount of money in people’s pockets, but more than that, enabling them to provide an adequate education to their children, to afford proper health care, and
to build a brighter future. In raising the income level of the people of NTT, we can raise their standard of living and foster self respect and a sense of dignity.

Because of this, the strategy of Repelita IV, which has focused on the fulfilment of basic needs, will be maintained and intensified in Repelita V. There will be greater focus on efforts to raise income levels by developing the bases of the rural economy through the GEMPAR ('Movement to raise the level of people's incomes'), which covers expansions of fruits, foodstuffs, and horticultural products for export; of large-scale and small-scale livestock and poultry; of small industry and handicrafts; and of fisheries and marine culture. These initiatives are implemented through integrated farming methods suited to the land and the climate, with an orientation towards markets, and are directed so that the proportion of the expanded commodities and the crops planted by the farmers will reach an economic scale. Such activities can simultaneously support the strategy of integrated agricultural development.

The underlying basic policy in Repelita V supports this regional development strategy oriented to increasing incomes. This policy is known as the 'Eight Primary Programmes' which are:

1. Increasing production and productivity in the agricultural and industrial sector through GEMPAR.
2. Raising the quality and the reach of community health care services, as well as extending information about basic principles of community health care.
3. Expanding and evenly distributing study opportunities and increasing the quality of education, as well as creating an educational environment which is creative, motivating and dynamic.
4. Increasing the efficiency and reach of services to commercial activities and cooperatives.
5. Implementing measures to control population growth and mortality in the framework of ensuring the success of the National Family Planning Programme.
6. Improving housing settlements and their environments.
7. Increasing the capabilities of the government apparatus and its agencies at every level of government.
8. Upgrading the network of communications towards an integrated communications system.

We are still carrying out many of these programmes. We know that the government has been dedicated in its efforts to ensure that areas requiring attention are continually pushed forward; however we all realize that the problems of development are complex, because they are located not only in the areas of funding and the physical environment, but are also influenced by the socio-cultural background of the community itself.

Apart from the matters I have just touched upon, there are many others which need attention and which will become material for discussion in this seminar. Hopefully, this seminar will be very productive and will make a valuable contribution to the development effort which we carry out with the aim of creating a society that is just and prosperous, based on the Pancasila. Therefore I hope that the conclusions of this study and seminar will be comprehensive and solid, and will approach accuracy and truth in solving problems. I trust that the conclusions can also be used as material for consideration in the development efforts of the NTT region, especially for regional and central government officials, as well as for the private sector.

I hope that for foreign aid donors, the outcome of this seminar will provide material for consideration that is decisive, especially for expanding current aid as well as providing new aid as we approach the period of take-off.

This concludes my brief address on this fortunate occasion, and finally, I wish all participants a fruitful seminar. The regional government of NTT will attempt to help as much as possible so that this seminar may proceed successfully.

With prayers to Almighty God, I now officially open the seminar, which proceeds from 7–9 November 1989. Thank you.

H. Fernandez
Governor of Nusa Tenggara Timur
BACKGROUND
The province of Nusa Tenggara Timur has one of the smallest average incomes per head in Indonesia. It is poorly endowed with natural resources, has a low rainfall and long dry season, and a population of over 3 million people pressing heavily on available land. Overexploitation and consequent degradation of the land are widespread, and poor living standards, including lack of water, help explain the generally bad health. The province’s infrastructures of roads, ports, health and education facilities are also weak, and further contribute to the pattern of underdevelopment. Its remote location and widely spread islands (Figures 1.1, 3.1 and 3.2) intensify the economic problem, where high transport charges add greatly to the cost of bringing in imports and shipping out exports. The province is a classic case of a remote peripheral economy, where high population pressures on poor land are worsening an already difficult situation.

Yet despite this depressing picture, the province’s economic growth over the last two decades has been good, albeit starting from a low base. The advance of the predominant agricultural sector, which mainly comprises food crops for subsistence and live cattle for export but further includes tree crops and fisheries, has been well above the Indonesian average since 1970, and there also been a recent expansion in the still small tourist sector. These healthy developments have been paralleled by advances in infrastructures and other services, so that the largely subsistence economy of the early 1970s has been transformed in the late 1980s to a more commercial orientation. These changes have involved trade linkages both within the islands of the province and from the islands to the main centres of Indonesian population and final demand. While overall growth collapsed somewhat in the early 1980s with the fall in cattle prices (Figure 3.3) accompanied by low crop yields under poor growing conditions, and the reduced ability of Jakarta to
Figure 3.1: Topography of Nusa Tenggara Timur
finance development, this fall has been subsequently reversed. Although NTT (and all Indonesian) cattle markets are partly insulated from international trends by bans on foreign exports and imports, the recent strengthening of global beef prices (World Bank 1990–91) is a good sign for the future.

The major role of agriculture, which still formed 53.9 per cent of RGDP in 1986 and was followed in importance by government (19.5 per cent) and commerce, hotels and restaurants (12.4 per cent), is highlighted by Supplementary Table 2. These three sectors, as well as transport and communications and banks and financial institutions, have grown rapidly commensurate with their size (Supplementary Table 3).

Within agriculture livestock, which mainly comprises cattle exports, has been the most dynamic sector, while food crops have been less important and fisheries and forestry have only expanded slightly (Supplementary Table 4). Smallholding tree crops, which include coconut for home and local consumption and coffee and cocoa for export, are another significant contributor to RGDP whose share has varied with large price fluctuations (Figure 3.3). More background on NTT agriculture is presented in Supplementary Tables 5–11, and figures on household incomes, land distribution, and food consumption are given in Supplementary Tables 14–15.

Information on infrastructures is provided in Supplementary Table 19, which denotes their steady improvement over the last decade. Details of the small ‘industrial’ sector are included in Supplementary Table 16, which highlights the importance of wood and wood products and non-metal mining equipment. But this table understates the importance of fish and coffee processing, and of the hand-weaving industry producing the traditional ikat and gaining increasing attention on Indonesian and foreign markets.

The province’s exports and imports are quantified in Supplementary Tables 17 and 18, which demonstrate the significance of livestock, tree crops and fish in earning export revenues and also show that considerable food and consumer durables are imported. Data on government receipts and expenditures, including remittances from the centre, are given in Supplementary Table 20, from which it may be seen that these remittances formed some 95 per cent of provincial government financial receipts. This is a higher proportion than in almost any other Indonesian province, and in such circumstances capital inflows from foreign projects become especially important.
Figure 3.2: Rivers of Nusa Tenggara Timur
Figure 3.3: Indices of major prices, Nusa Tenggara Timur 1970–79

Note: a Nominal prices deflated by the Jakarta Consumer Price Index.
Much further background on both present conditions and future development potentials of NTT are given in the recent study of Barlow et al (1990). The present chapter now identifies key socio-economic features of the province, and goes on to examine the chief avenues perceived as leading to improvement.

**Key features of NTT**

These are believed to be poverty, the dry and variable climate, the poor social and economic infrastructures, the remoteness from markets, and the complex social structure. The features are necessarily interrelated, and should all be carefully recognised in plans for developing the province's potentials.

*Poverty* in NTT is a basic aspect, and is reflected in the very low RGDP per capita—Rp228,000 in 1986 which was only 40 percent of the Indonesian average for that year of Rp578,000 (Supplementary Table 1). It is further emphasized by the facts that 54 percent of the population in 1987 was below the poverty line, and that both the labour force participation rate and infant mortality were high. Although the population density appears relatively low (Supplementary Table 1), this must be viewed in the contexts of a high proportion of uncultivable land and difficult climate. Such conditions mean that most people are deprived of what may reasonably be seen as basic needs, and that it may be hard to launch new economic enterprises until these needs are met.

Poverty in the province is also perpetuated through the ownership pattern of assets, where 41 per cent of farm land is controlled by 15 per cent of households (Supplementary Table 13) and cattle ownership is confined to an even smaller group. This skewed ownership is reflected in the uneven distribution of income (Supplementary Table 14).

The *climate* of NTT has a rainfall of 700–1500 mm per year compressed into a wet season of a few months, and is a major constraint on agriculture. The situation is exacerbated by great annual rainfall variability, and by land shortages stemming from population pressures which impel the cultivation of steep slopes, causing run-off and degradation. Scarcity of water in the long dry season also means that cattle congregate near the few drinking places, making for overgrazing and further degeneration. Under such circumstances, yields of all crops are low and animal mortality high, while farmers prefer low-risk farming systems and dislike change.
A significant related feature is the far greater variation of micro-climate in NTT than in most other parts of Indonesia. Hence although some areas of West Sumba and West Flores have relatively high and more certain rainfalls, in most of the province rain shadows caused by rolling topography impel large climatic disparities between closely adjacent sites. The variable and sparse environment generates special needs in new agricultural varieties and techniques, and means that packages developed for other better endowed and more uniform locations in Indonesia are often not suitable. Thus technologies brought in from outside must usually be adapted very substantially before they become appropriate to particular localities, and this can be a major task.

The parlous state of infrastructures in NTT is a crucial factor hampering economic and social development. One basic deficiency is in water supplies, where only 15 percent of households in NTT had access to piped drinking water at their residences in 1987 (Kantor Statistik 1976-88). Most such households were in urban areas, and nearly all rural dwellers fetch their water for drinking and agricultural purposes from some distance away, walking to the nearest well or creek. This is an onerous task usually undertaken by women and children. Another major difficulty is with communication, where with a few exceptions even roads between major centres are poor, and subsidiary roads serving minor centres and villages are usually rough tracks barely negotiable by four-wheel drives in good weather. Except on main roads there are frequently no bridges, and access to many districts is restricted to the dry season when rivers are crossable over stony beds. Again, sea port facilities are weakly developed, and Tenau near Kupang is the only place where large vessels can berth easily and cargo handling arrangements are reasonable. Other ports of the province can merely handle the small ships and ferries used in interisland trade. Further, the sole airport taking the medium-sized jets flying international routes is at Kupang.

Infrastructural items crucial to the health of the population are also lacking, and the difficulties of getting water mean that particularly in the dry season it may be hard for people to keep clean, while children may not attend school owing to carrying duties. Although the number of persons per health centre is near the Indonesian average (Supplementary Table 1), the need for such facilities is relatively greater owing to the low population density. Thus poor access to health centres and an insufficiency of trained midwives pose high risks to women during childbirth in remote areas. The prevalence of respiratory infections and
malaria, and the commonness of other contagious diseases including venereal infections (Dinas Kesehatan 1988), reflect partly on inadequate public health provisions. High incidences of skin and diarrhoeal diseases are additionally related to poor and dirty water supplies.

Educational facilities in the provinces are again weakly developed (Supplementary Table 1), where most rural people seldom proceed fully through elementary schools, and illiteracy is serious in remoter areas. Some one-fifth of all adult males and one-third of all females have never attended school (Biro Pusat Statistik 1987b), and even today it is said that 20 per cent or more of children never go to primary classes. The important infrastructure of electrical power generation remains minor despite substantial recent capacity increases (Supplementary Table 1), being chiefly confined to towns and larger centres. Only 8 per cent of all households had electric lighting in 1987, and the large majority relied on kerosene (Kantor Statistik 1976-88).

The whole infrastructure of government services in NTT is indeed underresourced, and unable to fulfil its designated roles. This is an acute constraint on official programmes of improvement.

The remoteness of NTT from the Indonesian heartland of Java is certainly a key feature, and adds greatly to the high costs of trade already imposed by poor internal infrastructures. This feature is also reflected in the restricted flow of 'information' from outside, where local people generally tend to be conservative and slow to appreciate the merits of possible new ventures. Again, remoteness makes it difficult in opening up new interisland or international markets, to secure the 'linkages' basic to underpinning a satisfactory producer–consumer relationship. These linkages entail such aspects as mutual information flows and confidence, and are of major significance in projects involving substantial outside exports or imports.

The final feature to be highlighted is the social structure of NTT communities, which is crucial in exploring socio-economic potentials. Here several distinct subcultures, racial groupings, and religious beliefs must be recognized, as must the subtlety of situations all too often misunderstood by outsiders. Thus traditional social arrangements regulated by adat exist side-by-side with religious organizations and requirements, and with the institutions and laws of provincial and central governments. Often, indeed, the same persons are involved in traditional, religious and official capacities at local level. While traditional arrangements extend back to time immemorial, Catholicism dominated in Flores and some parts of Sumba dates from the 14th century and
Protestantism characterizes much of West Timor from the 17th century. Especially in Sumba, the age-old practice of *merapu*, which is often crudely labelled animism, still involves many people including nominal Christians. Government only became significant to most communities with the consolidation of Dutch control over NTT early this century, and its present structure only dates back to the establishment of *New Order* authority from the late 1960s.

Certainly traditional community arrangements can be considered 'obstacles to change' by those wishing to promote 'modern' development, and many a scheme has fallen foul of them with disastrous consequences for itself. This has been true, for example, of recent attempts to establish 'nucleus estate' or *Perusahaan Inti Rakyat* (PIR) institutions for developing perennial cash crops; these have been unable to proceed owing to opposition by those controlling traditional land tenure. Other official schemes which have bypassed local leaders have also been less than successful.

Yet in an important sense, traditions entailing land and other important elements of economic activity may be seen as preserving the integrity of society, and hence dangerous to remove although they may be adjusted. They are useful barriers to some kinds of exogenously introduced change, which might otherwise replace old structures with new institutions promising short-term economic gains but disastrous for long-term social development. Certain business concerns, for example, have attempted to secure ownership or long-term leases over big tracks of land, so as to introduce mechanized cash crop cultivation excluding most local residents. They have justifiably not been permitted to proceed, however.

Local leaders and their followers are actually crucial elements in development, for which their support is essential. Hence the well-established church groups at village level in Timor and Flores have amply demonstrated their ability to mobilize people in economic enterprises (Webb 1986). Again, consultation and cooperation between traditional groups and non-government organizations have been vital to the viability and sustainability of small community improvement projects in West Timor (Barlow and Gondowarsito 1991).

**Developing socio-economic potentials**

The main avenues to improvement in NTT are perceived to be introducing new technologies, upgrading infrastructures, developing underexploited resources, adding value to local products, and reorienting
development agencies. These avenues, which are again necessarily interrelated, are now considered.

*Introducing new crop and livestock technologies*

Using new or improved technologies to raise the productivity of land, the scarcest and most exploited resource of NTT, deserves special attention. It notably involves planting better varieties of crops and forages, and introducing more advanced methods of crop and livestock husbandry.

In securing better crops and forages, it is vital to plumb more deeply than before world stocks of genetic materials, and to recognize the need to adapt such materials better to provincial conditions. These often differ greatly from conditions at the sites elsewhere in Indonesia where breeding is undertaken. They differ further in NTT itself, with its variable micro-climate. Hence facilities for local testing and further adaptation of planting materials should be extended. This need to develop better materials applies especially to the chief staple, maize, as well as to dry paddy and the grasses and tree legumes sustaining cattle production.

There is also insufficient activity in developing improved crop and forage husbandry methods for the conditions of the province. Although this must to some extent await the production of better seeds, good progress could be made through intensifying work on technologies already available. Such work at farming system sites can serve both to adaptively improve the performances of crops under circumstances replicating field practice, and to determine the components of relevant cultivation packages. It can further provide valuable feedbacks to breeding and selection.

For all crops and forages, it is crucial to make improved seeds available to farmers. There is no point in having better materials that are not put to effective use. Yet multiplication, storage, and distribution facilities are weak in NTT, and even existing new materials often cannot be secured by persons requiring them. Thus such facilities should be strengthened, and proposals like those of Judd and Campbell (1983:40) for dispatching seeds from production areas in each *kabupaten* to progressive farmers who multiply and distribute them should be followed up.

For livestock, it is judged that improvement should largely focus on cattle with their significance as a source of cash. The present Bali and Ongkole cattle are thought sufficient as a basis for improvement, and it
is not considered necessary to introduce animals from elsewhere for this purpose (see also Chapter 9, pp.94, 99). A policy of distributing improved cattle to small farmers who can then breed and hand-fatten their own stock is felt best, both for enhancing provincial herd quality and for widening cattle ownership beyond its present restricted focus. Cattle husbandry methods need development as well, partly through improving forage use, and partly through strengthening disease control and other management aspects including the selection by farmers themselves of their best animals for breeding.

For poultry, goats, and pigs with their vital nutritional significance, improvement is very difficult, and positive impacts are hard to make. At this stage the major step of eradicating Newcastle disease which regularly decimates NTT poultry flocks is considered a worthwhile objective, where a necessary start is in developing effective methods of control on the basis of systems used in other countries. Enhanced government services again have a role in all these livestock improvements.

It should be finally be mentioned that increases in land productivity stemming from both new technologies and the water supply improvements discussed below will themselves help to mitigate the adverse effects of population pressures on the environment. Obtaining such productivity increases is actually considered the best route to conservation.

Upgrading infrastructures

Remedying the weak infrastructures described above will often be a precondition to realizing other avenues of socio-economic growth. One vital aspect of this is improving water supplies, which themselves both directly enhance land productivity and promote better health and living standards. The main ways of bettering water supplies are through wells, captured springs, dams, off-the-roof tanks, submerged river pumps, and irrigation.

But despite the apparent pertinence of such installations, experiences with providing them have often been disappointing. Sometimes wells and captured springs have been poorly sited, and water from them has been inadequate and even seasonal. Sometimes, and especially in hilly country, there have been difficulties in establishing intermediate pumps over what may be several kilometres of main piping from a captured spring. Again, pump maintenance has frequently been lacking, so that facilities have become unusable after breakdowns which cannot
be serviced owing to the absence of local skills. Often, too, wells and springs are handled badly, so that water becomes polluted or is wasted through leakages. With dams and intermediate holding tanks, ongoing supply reticulation has commonly been insufficient to cover target households and livestock. All these problems reflect inadequate planning and technical supervision, as well as poor community participation. The scarcities of large equipment and expertise to handle dams have also constrained the number established, and meant that some have been so badly constructed as to subsequently collapse. Much further attention is needed to these aspects.

Another necessity in upgrading infrastructures is bettering the roads serving villages and hamlets in rural areas, which by reducing transport costs opens such places to the market. Once more, improving sea and air ports is fundamental to expanding interisland and international trade and tourism. A further central aspect is enhancing the provision of doctors, ancillary staff and equipment, together with clinics and hospital buildings, which is fundamental to raising the poor health levels that stop people from realizing their socio-economic potentials. A similar need applies to bettering the vital educational services provided both through schooling and the extension services in agriculture, fisheries, and other spheres. In general, the government institutions supplying these physical, health and education infrastructures have worked quite well, and the chief constraint has been in the lack of funds to support them. Such funds need to be made available on a scale to secure real improvement.

Developing underexploited resources

While land is currently overexploited in NTT, both fisheries and tourism may be seen as utilizing resources which could be harnessed more fully to the economic and social benefit of the province.

Fisheries are probably the chief underexploited resource, where despite the considerable recent growth of output (Supplementary Table 9) there are still abundant stocks of tuna and other marketable fish in the Savu and Flores seas (Figure 1.1). The principal means of realizing higher production is through introducing further medium-sized vessels and equipment to fish these grounds from bases in the main ports of Maumere, Ende, Larantuka, and Kupang. There must also be an upgrading of cold storage and processing facilities, together with better linkages to the chief markets in Bali and Java. Besides these
large-scale developments, useful scope also exists for helping traditional artisanal fishermen to improve their activities with reef-fish and lobster. This is through providing better equipment, training, and market linkages.

These initiatives are all labour-intensive, and can create employment for many workers. They are best undertaken through the private sector, although basic infrastructures should be supplied by government as suggested above.

The tourism resource of NTT resides in its outstanding natural features, including the Komodo island park with its ‘dragons’ (Figure 1.1), the coloured lakes at Kelimutu near Ende, the good beaches in various places, and the distinctive cultural features. The location of NTT close to the main tourist routes through Bali, as well as to Darwin, is another positive element.

To exploit this tourist potential which has until now been barely tapped, an important prerequisite is expanding relevant facilities. These include resort complexes and associated aspects including special transport, roads to places of interest, and other services at such places. Whilst government must once more be responsible for roads and other basic infrastructures, private business should take the major role in providing accommodation, special transport, and the remaining necessary developments.

Adding value to local products

This avenue of improvement may sometimes only involve raising the quality of an existing product, but may also entail moving ‘downstream’ through further processing. It may enhance revenue substantially, and is most likely to be attractive where products have interisland or foreign export markets giving opportunities of large expansion. The local provincial market is not only small, but generally offers limited incentives for either quality or downstream development. Yet while enhancing revenues from adding value is always intuitively appealing, its economics must be scrutinized carefully since its costs are frequently too high or its returns too low. It should also be noted that for any new processing enterprise substantial charges are commonly incurred in exploiting and opening up new markets. These are additional to plant investment and processing costs, and should not be underestimated.

Hence although cattle are the chief exported item from NTT, it appears that their further processing is not profitable and that the only
economic adding of value is through ‘finishing’ them better in the fattening process and handling them more carefully to avoid damage in course of transport to their destinations. While a meat boning and packing enterprise which shipped refrigerated meat to Jakarta was set up in West Timor in the late 1970s, it proved uneconomic owing to its small scale, fluctuating throughout, and high transport costs.

The other chief candidates for adding value are coffee, fish, and hand-woven textiles, for which further processing seems advantageous. Coffee processing is already widespread in NTT, but it is judged that good possibilities exist for extending downstream from the current green bean exports to ground and roasted coffees which could have Australian markets through Darwin. As well, the quality and price of coffee output could be enhanced by introducing and planting Arabica and other new varieties. These have been selling at a large premium to the Robusta which is chiefly cultivated now, and may confer special tastes when grown in appropriate locations. Much could also be done to enhance the standard of beans produced by smallholders, although this depends on more effective extension. The adding of value to seafoods in NTT partly depends on implementing the integrated fishing arrangements discussed above, which should themselves secure quality improvements through better handling and systematic grading. Again, downstream processing could be obtained by small canneries handling 3,000-4,000 tonnes of fish and shrimp per year. These appear viable at current prices, and there is already enough output to justify one such plant at Maumere and several other fishing ports (Supplementary Table 6).

Lastly, the possible return from the further production of hand-woven textiles appears excellent, with a rising demand on outside markets for these products. The chief needs are for much better quality control and market linkages, and the feasibility of attaining these objectives has already been demonstrated on the island of Savu by a local non-government organization (NGO), Le Rae. This well-managed agency has greatly enhanced weavers’ returns, and its example could usefully be followed elsewhere.

All these developments with their links to commerce and trade are appropriately undertaken by the private sector, including not only commercial businesses but NGOs which seem better placed to make
appropriate arrangements in the case of a cottage industry like hand-weaving.

Reorienting development agencies

Improving the thrust of government and private agencies concerned with economic and social development is manifestly an all-important avenue to effective change. The private agencies referred to here are those of the ‘modern’ sector, comprising commercial businesses and NGOs. The traditional social institutions at local level are largely immune to outside manipulation, and essentially evolve in a dynamic of their own.

In the situation described of gross underfunding for government agencies, with the further likelihood that public development finance will not increase much, rationalizing official programmes to make the best use of available resources seems a key goal. Priorities should be established, and activities reorganized for greater effectiveness and sustainability. Programmes outside the preferred spheres might well be discontinued. One constraint facing such adjustment, however, is the national pan-Indonesian scope of most official programmes, for this renders changes at the level of one small province hard to make.

Yet it is still possible within this constraint to give prime attention to the development emphases outlined above in generating technologies, upgrading infrastructures, developing fisheries and tourism, and adding value to products, and a detailed and prioritized listing of suggested key areas for development is given in Appendix III. One useful further source of finance and other skills for official programmes in these areas is help from foreign governments, which during the 1980s has been directed to integrated area development (IAD) schemes (Chapter 15). But here again lessons need to be learned from past experience, and future projects have to be reoriented more effectively. Bappeda as the chief planning and coordinating agency in the NTT government necessarily has a vital role in any reorientation, working in conjunction with the various Kanwil and other official departments.

With the private agencies, reorientation is again desirable, and here encouragement from government, and from Bappeda in particular, is necessary. With commercial businesses such encouragement should look to the roles already suggested for them of developing fisheries and
tourism, and adding value to local products, where joint ventures may also be used as a means of harnessing private foreign investment capital. With NGOs which may again have access to certain overseas funds, the encouragement should especially look to their taking part in village-level activities.

It may well be desirable, indeed, for government with its limited resources to act (outside the areas of its special responsibility in providing services and infrastructures) in the role of coordinator and monitor. This stance would leave commercial businesses, NGOs, and foreign agencies in their respective spheres to undertake most actual development work. Such an approach which should be considered carefully. and it is discussed further in Chapter 15.

Conclusion

This chapter has emphasized the great difficulties of NTT with its poverty, difficult climates, poor infrastructures, and remoteness. But it has also suggested useful potentials for social and economic advance, building on the impressive progress already made since the early 1970s. These potentials entail key sectors in agriculture, fisheries, tourism, and cottage industry, in all of which good economic prospects can be discerned. Much further detail of these possibilities is given in the following chapters of this book.

Implementing the suggestions made here and elsewhere in the book will often be difficult, partly because many basic problems and solutions are interlinked. This means that separate avenues often have to be tackled together if any advance is to be made, which is notably so when improvements depend on enhancing basic infrastructures. A further major constraint springs from the shortage of financial resources for improvement.

Owing to both the interlinkages and the need to draw on all available skills and finance, exploring the potentials outlined must generally entail a combined effort on the part of government and private and foreign agencies, acting in collaboration with the local communities involved. But given such collaboration and a focusing of activities along the lines suggested, it is believed that the poverty of NTT people can be progressively overcome, with a consequent growth in key sectors making the province one of the more dynamic regional economies of Indonesia.
LAND AND ENVIRONMENT IN NTT

Kate Duggan

This chapter briefly describes aspects of the environment and environmental variation, and their implications for development and quality of life for the population of NTT.

Climate

NTT lies in the low latitudes, between 8–10° south of the Equator. The province experiences a seasonally wet climate, characterized by a hot dry season between May and October and a hot wet season between November and April. This seasonality restricts the amount of food which can be grown and when. Most of the agricultural effort is concentrated in the wet season, which can be as short as four months, and there is a large emphasis on the storage of food with which to sustain the population until the next wet season when crops are grown again.

There is, of course, considerable variation in the length of the wet season and in annual rainfall totals within NTT. The orographic effect of the mountainous terrain (Figure 3.1) is a major factor in spatial rainfall variability, with some regions experiencing over 2,000mm per year and others averaging less than 700mm. The population concentrations tend to be in the higher rainfall areas, which receive about 1,000–2,000mm per year. These are the areas of greater productivity and reliability.

There is not only considerable spatial variation in rainfall, which has influenced population distribution, but rainfall also varies between years. As recently as twenty years ago, the climate of the low latitudes was described as reliable as compared with certain temperate regions. This description is to some extent correct for the seasonally wet tropics, because there is a very high probability that there will be a wet season and a dry season in an annual basis. However, the great increase in weather and atmospheric observation in the low latitudes during and since World War II has revealed significant variability in annual
rainfall. Of particular note is the variation in the timing of the onset of the wet season, which for NTT can be anywhere between late September and early December. This has serious implications for agricultural economies which are largely dependent on dryland farming. The time of planting is critical for many food crops, and a late start in the wet season can result in failure of staple crops and subsequent food shortages. Furthermore, a prolonged dry period during the wet season can have equally disastrous results.

One of the benefits of many recent development projects has been a reduction in this dependence on natural rainfall and in the susceptibility to rainfall variability. Irrigation schemes and the development of perennial surface and groundwater supplies have achieved this in certain areas.

Water shortage is considered a major constraint to development in NTT, but the problem is more accurately the underexploitation of available water resources and continued dependence on natural rainfall with all of its uncertainty. Harvesting and storage of the wet-season surplus water through collection of rainfall, retention of runoff or storage of runoff, and more efficient use of natural reserves on flood plains and in aquifers are areas for further attention in development and aid projects.

Annual drought and rainfall uncertainty are not the only or perhaps the most important environmental factors contributing to the relative poorness of rural economies in NTT, but they are factors which can be targeted through development. A further factor which deserves consideration is the geomorphic history and its implications.

**Geomorphic history**

NTT has a rather complex geomorphic history which, to a large extent, has defined many of the limits to the productivity and capability of land. It is imperative that this history is understood and is considered in planning for development. Given the feasible technology and the environment of NTT, some options for development are simply not sustainable. For example, there is little benefit in damming a river which transports enormous quantities of sediment, irrigating a river which is known to change course, or terracing slopes susceptible to landslides. Consideration of the geomorphology of an area will allow options for development to be more accurately defined.
Moreover, the geomorphic history has resulted in considerable environmental variation within NTT. Options for development which are suited to some areas may not be suitable throughout NTT. For example, development of surface water storage will be a more suitable option in old clay bed areas than in areas where limestone is the major parent material.

NTT straddles a dynamic crustal plate region. The islands of Timor, Sumba, Savu and Rote (Figure 1.1) lie on the outer arc of the Banda Arc System. The Banda Arc System has ridden up onto the Australian crustal plate, resulting in uplift of the islands on the outer arc. The islands of Flores and east to Alor lie on the inner Banda Arc, to the north of the crustal plate collision/subduction zone. These islands are volcanic in origin.

This difference in origin explains much of the environmental variation between the outer and inner Banda Arc Islands. The major geological parent materials of Timor, Sumba and the other uplifted islands are marine in origin or derived from marine sediment, and include clay beds, coral, limestones and marls which give rise to particular soil types including cracking clays, red earths and lithosols which are predominantly calcareous. Marine fossils are found at elevations of 1,000m on the uplifted islands, and old alluvial terraces have been raised several hundreds of metres above the present sea level. Uplift began about 25 million years ago and is continuing today. The process has been episodic with three major phases of uplift identified in Timor, and the resultant steep slopes contribute to naturally high rates of denudation.

The susceptibility of the uplifted islands to high rates of denudation is further influenced by the moderate to high erodibility of soils derived from marine sediments. These tend to be saline and to readily disperse in water. On steep slopes, the junction between layers of sediment tends to be unstable, giving rise to landslides and mass movements which remove tonnes of surface material in single events. Continued seismic activity through crustal plate movement further adds to the instability of the uplifted islands, and possibly triggers landslide activity.

So, on the uplifted islands there are: steep slopes, erodible soils, unstable junctions between sedimentary layers, and seismic activity. All of these contribute to natural instability. Add the seasonal input of high-intensity rainfall, and the result is an erosive environment.
In contrast, the volcanic islands to the north comprise stable geological parent materials upon which well structured soils have developed. These islands are generally more stable and productive.

The geomorphic features of the uplifted and volcanic islands have implications for development. Exploitation of groundwater would logically take a high priority on an island comprising coral and limestone formations for example, while unstable sedimentary materials should be avoided when siting major infrastructure such as roads. But the main purpose in contrasting the outer and inner Banda Arc islands is to underline the error in implementation of single technologies throughout NTT. The environmental differences impose different potentials and constraints to development.

One good example of the dangers of the ‘blanket approach to technology transfer’ can be found in a programme to promote conservation farming. Bench terracing has been promoted throughout NTT to control soil erosion in dryland cropping areas. This farming method has provided good results in the areas of well-structured volcanic soils of Java and Bali but has been counterproductive in Timor. The shallow, erodible soils which dominate on the latter island are inherently unsuited to bench terracing, and the implementation of this method has introduced higher labour inputs with negative returns. It is not only counterproductive to farming but is a waste of the scarce resources available for conservation farming, which are so badly needed.

**Land use**

I have discussed the climate and geomorphology of NTT, and have referred to some of the implications for development. Now I will raise the issue of how humans have modified the landscape and how this is likely to affect future development. I will use Timor as a case study because I am most familiar with this island, although many of the land use practices I will cite are widespread throughout NTT.

Much of Timor was cleared of its primary forest in the past 400 years. Secondary regrowth in the form of open woodland, scrub and grassland now dominate as the major vegetation types. There is little doubt that this history of forest clearing has accelerated erosion rates and has led to a decline in soil structure. Landslides, for example, are likely to have been less frequent and less widespread under forest.

The introduction of Bali cattle after 1910 has had two major impacts on the land. First, and most directly, cattle tracks and pads have
destabilized hillslopes leading to mass movement. Probably of greater significance is the annual burning of grazing land to promote 'green pick'. This practice exposes the soil to the impact of high-intensity wet season rainfall.

A further factor in the exposure of soil to wet season rainfall has been the reticence to use mulch in agricultural systems. Mulch, which has been shown elsewhere to improve silt structure and soil protection, is typically disposed of in Timor. In general this practice, rather than shifting agriculture, is at present contributing to soil erosion.

The contemporary surface of Timor can only be described as a degraded landscape. Although naturally unstable, the history of land use has significantly contributed to this degradation creating an environment in which landslides, surface erosion, weedy secondary vegetation, turbid surface runoff and enormous river sediment loads are characteristic.

Soil erosion is the most important environmental problem facing NTT. It is having a two-fold effect; reducing the productivity of land, and reducing water quality.

Sediment in high concentrations is a nasty pollutant, and quite a few even nastier constituents tend to bind with fine sediment. In NTT, I have rarely seen runoff or river flow which would not exceed the World Health Organisation's health limits for sediment concentration. The United Nations Hydrological Decade Charter states that every person has a right to a clean, safe water supply. This is clearly not a reality in NTT.

Sediment is virtually impossible to control when it is in suspension. The answer lies in reducing on-site erosion. Furthermore this would reduce the loss of valuable topsoil. The movement of the soil particles down a slope, however, is a complex process involving the interaction of several factors. These include; rainfall, runoff, wind, gravity, surface cover, slope angle and length; soil texture and structure, particle shape and density, and the biological activity at and below the surface. This myriad of factors and the variation in rates over space and time make the control of erosion difficult and in many instances ineffective.

Control of erosion at the source is usually the most sensible long-term strategy to maintain productivity and reduce sediment yields, but one should not forget that this may have a negligible short-term impact on sediment delivery if there is already considerable soil in transit and in storage down the slope. The expected benefits from on-site erosion
control should therefore be clearly defined in terms of on-site and off-site processes, and in a realistic time frame.

So let us look at this problem. The rural population of NTT is dependent on agriculture. The major environmental problem facing these people is soil erosion, which is reducing agricultural productivity and water quality. Long-term control of the problem must be focused at the source. The main source is agriculture (including cattle). How can this environment, and in particular the land resources, be better developed to make them more user friendly? The focus here for development is in management.

Management

Throughout the world people have modified their environment to improve their quality of life. Nations fight for the right to exploit their environment for the economic benefit of their people. Why should not the Western world, for example, compensate Brazil for leaving its remaining rainforest intact? But there is another consideration. Will the quality of life in the future be degraded by the environmental modifications occurring today?

A major barrier to soil conservation in developing countries is the argument that soil conservation introduces an additional labour requirement to communities which are not readily able to absorb it. The future generations, however, must also be considered. Timor's shallow soils cannot sustain the present rates of erosion and feed a growing population. Erosion rates which are naturally high have been accelerated by expedient land use practices. Do the people who are already justifiably suspicious of the technocrats expect technology to find the answers? There is a fundamental contradiction here.

Development projects must look for options which will improve quality of life but not damage future potentials. Production from the land must be sustainable within the given technological circumstances. In NTT this means an agricultural production system without large fertilizer inputs or other artificial soil improvements, and without sophisticated mechanization for the foreseeable future.

What can these options be? The classic approaches to land management planning for sustainable production are:

1. **Land capability suitability approaches**: In this method, the land is theoretically carved up into parcels which are rated as having a certain capability/suitability, and land use is regulated accordingly.
2. **Zonation (e.g. agro-climatic zones):** This is a broader system of land classification which can be used to determine optimum land use on the basis of climate, soils and relief.

3. **Slope criteria:** For many regions, limits for cultivation are based on slope in an attempt to reduce erosion hazard. This has not proven effective.

Land use regulation as described by these approaches is not relevant where land is traditionally owned and traditional practices are well entrenched. What else is there? Agro-forestry has been investigated as an option for sustainable land management in NTT. If successful it would stabilize agriculture, and result in large areas being under perennial tree crops. This option is still debated, but it is evident that the greatest potential for improving land management lies in a system which is a modification of traditional land use practices.

In NTT, as in many regions of the tropics, there are insufficient data on rates of land degradation and on the benefits and negative effects of various farming systems. The task of collecting this information would form a project in itself. Until such data are available, the development of sustainable food production systems will continue to be a trial-and-error affair.

There is a budding resistance to research in aid projects. This resistance will, hopefully, be nipped in the bud. On the other hand, the home politics of donor nations will ensure that environment and land management will play an increasingly important role in aid. The Nusa Tenggara Timur Integrated Area Development Project showed recognition of this need, and there is likely to be an even greater emphasis on future projects.

**Conclusion**

In summary: NTT is hot; there is an annual flood and an annual drought; the lithology is variable but there are large tracts of erodible soils and degraded land; and productivity is probably declining. There are three recommendations which may be drawn from this and the preceding discussion:

1. Management of water resources is an important focus.
2. Development projects must consider the specific environmental history and characteristics of an area before any technological inputs are made.
3. Research into sustainable farming systems is urgently required. Although this is not a promising picture, the quality of life will not decline if management is improved.
Social development in a poor province or a poor country poses difficult problems for policy-makers. The primary responsibility for many aspects of social development in developing countries, and particularly for health and education, has been transferred from individuals or the community to governments. Typically, the erosion of traditional social institutions that has accompanied modernization has coincided with sharply rising community expectations about health, education and general welfare on the part of individuals; and increased recognition of the long-term political and economic importance of social development in government. Individuals see social development as the main outcome of economic development, while governments increasingly see it as an input into the development process, an element of the human resources development that is considered to be essential for economic development. Where the level of economic growth has not been sufficient for individuals to meet rising expectations from rising real incomes, governments have come under increasing pressure from the population in general and from development policy advisers to divert scarce revenues to social expenditure, particularly on health and education. At the same time, financial stringency in the debt-ridden 1980s has placed such governments under equally strong pressure to curb all public expenditure.

Both central and regional governments face a particularly difficult problem with respect to poor provinces such as East Nusa Tenggara (NTT). The level of social development in the province, which is one of the poorest in Indonesia, is low. According to the BPS-computed Physical Quality of Life Index for 1985 (Table 5.1), NTT was the fourth poorest province. Although physical and social infrastructural development is only modest, the level of subsidy from the central
government to NTT is already one of the highest in the country. Prospects for increasing local government revenues in the foreseeable future are limited (Comer 1989:61; Barlow et al 1990:58). Efforts to raise the level of social development thus impose a large and, in the short to medium term, ever-increasing burden on the regional budget. At the existing low levels of social development, improvements to health and education can be expected to have very little short-term impact on the income-earning potential of the province. Some important kinds of social development, particularly improvements in health services leading to falling infant and child mortality and improvements to primary and junior secondary education, will lead directly to increased demands in the provincial budget, as more children survive to enter school and continue from lower to higher levels of education. Some of the potentially revenue-raising benefits of improved human resources development in the province are likely to be reaped by other provinces, especially those on Java which are better able to provide appropriate employment for more educated workers.

From a purely regional perspective, the province cannot afford the expenditures necessary to lift social development, and is unlikely to benefit markedly in the short term from such an enterprise. From the perspective of the national government, marked differences in living standards between provinces are internally divisive, internationally embarrassing and represent a waste of potentially valuable human resources. An important question for Indonesian policy-makers is: in what context should social development in a poor province be viewed? From a national or from a regional perspective? Does it make a difference?

Table 5.1 summarizes one national view of social development in NTT, comparing human resources development in the province with the national average. In relation to its per capita income, the province has surprisingly high levels of human resources development. Infant mortality is slightly above, and life expectancy at birth slightly below, the national average but, for one of the poorest provinces in the nation, the mortality record in NTT is rather better than would be expected on the basis of income figures. The quality of human resources is, by national standards, quite high. The percentage of population aged ten years and over who have never attended school is slightly above the national average for males, but very close to the national average for females. This may be partly due to the strong role of the churches in education in parts of the province, which dates from colonial times.
Table 5.1: East Nusa Tenggara: human resources development in national perspective (1)

|-------------------------|----------|----------|----------|----------|----------|----------|

### a. Economic Indicators

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Per capita income</td>
<td>228</td>
<td>578</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(000 rupiah) (1986)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical quality of life index</td>
<td>47 51</td>
<td>52 59</td>
<td>67 72</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### b. Population Indicators

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercensal rate of growth (%)</td>
<td>1.6</td>
<td>2.0</td>
<td>2.3</td>
<td>2.0</td>
<td>2.2</td>
<td></td>
</tr>
<tr>
<td>Total fertility rate (%)</td>
<td>6.0</td>
<td>5.5</td>
<td>4.7</td>
<td>5.1</td>
<td>4.1</td>
<td></td>
</tr>
<tr>
<td>Infant mortality rate (no/1000 births)</td>
<td>147 152 117 112</td>
<td>81 78</td>
<td>125 129 115 98</td>
<td>67 64</td>
<td>118 143</td>
<td></td>
</tr>
<tr>
<td>Life expectancy at birth (yrs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>46 45 48</td>
<td>51 54 59</td>
<td>58 62</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>49 48 51</td>
<td>54 59 62</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### c. Education Indicators

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Population 7–12 years attending school (%)</td>
<td>76 91</td>
<td>92 94</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Highest educational attainment population aged 10+ (%) 1987

<table>
<thead>
<tr>
<th></th>
<th>NTT</th>
<th>IND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Never attended school</td>
<td>18 27</td>
<td>12 26</td>
</tr>
<tr>
<td>Primary, not completed</td>
<td>45 40</td>
<td>39 37</td>
</tr>
<tr>
<td>Primary, completed</td>
<td>26 26</td>
<td>29 25</td>
</tr>
<tr>
<td>Junior secondary</td>
<td>6 4</td>
<td>10 7</td>
</tr>
<tr>
<td>Senior secondary and above</td>
<td>6 2</td>
<td>10 5</td>
</tr>
</tbody>
</table>

Student/teacher ratio—1985/86

<table>
<thead>
<tr>
<th></th>
<th>NTT</th>
<th>IND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Junior secondary</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Senior secondary</td>
<td>16</td>
<td>14</td>
</tr>
</tbody>
</table>

Literacy rate 1985 (%):

<table>
<thead>
<tr>
<th></th>
<th>NTT</th>
<th>IND</th>
</tr>
</thead>
<tbody>
<tr>
<td>total</td>
<td>76</td>
<td>81</td>
</tr>
<tr>
<td>urban</td>
<td>95</td>
<td>90</td>
</tr>
<tr>
<td>rural</td>
<td>73</td>
<td>77</td>
</tr>
</tbody>
</table>

(continued next page)
### Table 5.1 (continued)

<table>
<thead>
<tr>
<th>d. Health Indicators 1985</th>
<th>NTT</th>
<th>IND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population per hospital bed</td>
<td>1,922</td>
<td>1,960</td>
</tr>
<tr>
<td>Population per doctor</td>
<td>16,160</td>
<td>8,130</td>
</tr>
<tr>
<td>Population per nurse</td>
<td>2,813</td>
<td>3,146</td>
</tr>
<tr>
<td>Population per health centre (Puskesmas)</td>
<td>20,273</td>
<td>29,542</td>
</tr>
<tr>
<td>Contraceptive prevalence 1985(^b) (%)</td>
<td>27</td>
<td>39</td>
</tr>
<tr>
<td>Population per family planning clinic</td>
<td>2,718</td>
<td>3,095</td>
</tr>
<tr>
<td>3 years of age, 1986 (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>moderate malnutrition</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>severe malnutrition</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Average daily consumption per capita:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>calories</td>
<td>1,899</td>
<td>1,798</td>
</tr>
<tr>
<td>protein</td>
<td>49</td>
<td>43</td>
</tr>
<tr>
<td>Per cent households in 1985 having:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>electric lighting</td>
<td>8</td>
<td>31</td>
</tr>
<tr>
<td>piped drinking water</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>private bathing facility</td>
<td>34</td>
<td>35</td>
</tr>
<tr>
<td>septic tank</td>
<td>7</td>
<td>15</td>
</tr>
</tbody>
</table>

**Notes:**

\(^a\)IND = Indonesia

\(^b\)Percentage of married women aged less than fifty who were current users 1985.

**Source:** Kantor Statistik, 1976–88. 1971 and 1980 figures (as quoted in this source) are based on the respective censuses for those years. Figures for 1985 (as quoted) are derived from the National Intercensal Population Survey (SUPAS). Figures for 1986 are based on the National Socio-economic Sample Survey (SUSENAS).

The kind of statistics presented in Table 5.1 may obscure important differences in the quality of services and institutions recorded. In the case of education, the long-standing involvement of the churches in education suggests that the quality of education for the province is at least equal to, and may exceed, that represented by the national figures. The provision of health services, measured in terms of the population to be served, is about average for Indonesia as a whole, although the province suffers from a serious shortage and a poor distribution of doctors. However, it is likely that the quality of some government health services in small, isolated communities is lower than that represented by the national average. The generally low level of development in NTT is most clearly revealed in the poor access to domestic facilities
such as electricity for lighting, piped drinking water and septic toilet facilities.

Table 5.2 shows a slightly different national view of social development in NTT, comparing it with the national capital. This table emphasizes the potential for human resources development in NTT. Although the level of human resources development in the province compares reasonably favourably with the national average, the gap between the quality of human resources in NTT and the best that is currently available in the country is marked. That gap emerges in all areas of social development, from the quality of human capital, as reflected in education, to participation in the broad benefits of development, as reflected in health and access to modern facilities.

**Table 5.2: East Nusa Tenggara: human resources development from a national perspective (2)**

<table>
<thead>
<tr>
<th></th>
<th>NTT</th>
<th>DKI Jakarta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per capita income (Rp. '000)</td>
<td>228</td>
<td></td>
</tr>
<tr>
<td>Population growth 1980–85 (%/yr)</td>
<td>2.3</td>
<td>3.9</td>
</tr>
<tr>
<td>Population density (no./km²)</td>
<td>65</td>
<td>13,365</td>
</tr>
<tr>
<td>Population 7–12 attending school (%)</td>
<td>92</td>
<td>96</td>
</tr>
<tr>
<td>Population aged 10+ literate (%)</td>
<td>74</td>
<td>96</td>
</tr>
<tr>
<td>Population with senior secondary or higher education (%)</td>
<td>4</td>
<td>23</td>
</tr>
<tr>
<td>Population with junior secondary education (%)</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>Total fertility rate</td>
<td>5.1</td>
<td>3.3</td>
</tr>
<tr>
<td>Infant mortality rate (no./1000 births)</td>
<td>74</td>
<td>33</td>
</tr>
<tr>
<td>Life expectancy at birth (yrs):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>males</td>
<td>56</td>
<td>66</td>
</tr>
<tr>
<td>females</td>
<td>59</td>
<td>70</td>
</tr>
<tr>
<td>Per cent population 10+ in 1984 who:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>listened to radio</td>
<td>40</td>
<td>66</td>
</tr>
<tr>
<td>watched television</td>
<td>16</td>
<td>92</td>
</tr>
<tr>
<td>read newspapers or magazines</td>
<td>15</td>
<td>56</td>
</tr>
<tr>
<td>watched films</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>are members of social organizations</td>
<td>26</td>
<td>42</td>
</tr>
<tr>
<td>Per cent of households in 1985 having:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>piped water for drinking</td>
<td>16</td>
<td>34</td>
</tr>
<tr>
<td>electric lighting</td>
<td>8</td>
<td>87</td>
</tr>
<tr>
<td>private septic tank</td>
<td>7</td>
<td>51</td>
</tr>
<tr>
<td>private bathing place</td>
<td>33</td>
<td>67</td>
</tr>
</tbody>
</table>

*Source: Kantor Statistik*, 1976–88. Figures for 1984 (as quoted in this source) are derived from SUSENAS. Figures for 1985 are derived from SUPAS.
Table 5.3 presents a regional perspective of human resources development in NTT, emphasizing the extent of intra-provincial variation. This table also highlights the potential for improvement, even within the constraints imposed by the government budget, infrastructure and per capita income levels at the provincial level. Social development varies widely throughout the province. Access to facilities and the quality of life in the capital, Kupang, compare quite well with average conditions elsewhere in Indonesia, but higher infant mortality rates, lower expectation of life and very limited access to a range of modern facilities in the less developed kabupaten indicate the need for much more extensive social development in the province.

Table 5.3: East Nusa Tenggara: human resources development from a regional perspective

<table>
<thead>
<tr>
<th>NTT</th>
<th>'Best' kabupaten</th>
<th>'Worst' kabupaten</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of growth of population (%/yr)</td>
<td>2.3</td>
<td>Kupang 3.2</td>
</tr>
<tr>
<td>Population density (no./km²)</td>
<td>65</td>
<td>Ende 106, TTS 94, Sikka 140</td>
</tr>
<tr>
<td>Infant mortality rate (no./1000 births):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>93</td>
<td>Sumba Timur 73</td>
</tr>
<tr>
<td>female</td>
<td>75</td>
<td>Kupang TTS 66</td>
</tr>
<tr>
<td>Per cent workforce in agriculture</td>
<td>82</td>
<td>Kupang 67</td>
</tr>
<tr>
<td>Per cent workforce in industry</td>
<td>7</td>
<td>Belu 15</td>
</tr>
<tr>
<td>Per cent workforce as unpaid family workers</td>
<td>44</td>
<td>TTS 24, Ngada, Manggarai, Sumba Timur 53</td>
</tr>
<tr>
<td>Per cent self-employed</td>
<td>19</td>
<td>Manggarai 5</td>
</tr>
<tr>
<td>Per cent illiteracy 1985</td>
<td>24</td>
<td>Alor, Ngada 14</td>
</tr>
<tr>
<td>Per cent female illiteracy</td>
<td>29</td>
<td>Alor 17</td>
</tr>
<tr>
<td>Student/teacher ratio 1987</td>
<td>23</td>
<td>Manggarai, Sumba Barat 30</td>
</tr>
</tbody>
</table>

(continued (next page))
Table 5.3 (continued)

<table>
<thead>
<tr>
<th></th>
<th>NTT</th>
<th>'Best' kabupaten</th>
<th>'Worst' kabupaten</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education participation rates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per cent population 7–12 not attending school</td>
<td>9</td>
<td>Flores Timur 8</td>
<td>TTS 12</td>
</tr>
<tr>
<td>Per cent population 10+ with no formal education</td>
<td>18</td>
<td>Ngada 9</td>
<td>TTS 31</td>
</tr>
<tr>
<td>Primary education not completed</td>
<td>45</td>
<td>Manggarai 56</td>
<td>Alor 21</td>
</tr>
<tr>
<td>Primary completed</td>
<td>26</td>
<td>Alor 48</td>
<td>Sikka 16</td>
</tr>
<tr>
<td>Junior secondary</td>
<td>6</td>
<td>Kupang 9</td>
<td>TTU 1</td>
</tr>
<tr>
<td>Senior secondary or higher education</td>
<td>6</td>
<td>Kupang 15</td>
<td>Belu 1</td>
</tr>
<tr>
<td>Percent females 10+ with no formal education</td>
<td>27</td>
<td>Sikka 14</td>
<td>TTS 42</td>
</tr>
<tr>
<td>Primary education not completed</td>
<td>40</td>
<td>Sikka 62</td>
<td>Alor 24</td>
</tr>
<tr>
<td>Primary completed</td>
<td>26</td>
<td>Alor 47</td>
<td>Sikka 16</td>
</tr>
<tr>
<td>Junior secondary</td>
<td>4</td>
<td>Kupang 7</td>
<td>Belu 2</td>
</tr>
<tr>
<td>Senior secondary or higher education</td>
<td>3</td>
<td>Kupang 7</td>
<td>TTS 0</td>
</tr>
<tr>
<td>Per cent households in 1985 having:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric lighting</td>
<td>8</td>
<td>Kupang 17</td>
<td>TTS 1</td>
</tr>
<tr>
<td>Piped water</td>
<td>16</td>
<td>Flores Timur 56</td>
<td>Sumba Barat 4</td>
</tr>
<tr>
<td>1985 population:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per hospital bed</td>
<td>1922</td>
<td>Ende 1074, Sikk 911, Manggarai 4905</td>
<td>TTS 4373</td>
</tr>
<tr>
<td>Per doctor</td>
<td>16160</td>
<td>Kupang 6208, Manggarai 28821</td>
<td>TTS 32797</td>
</tr>
<tr>
<td>Per nurse</td>
<td>2813</td>
<td>Ende 1973, Kupang 1810, Manggarai 3202</td>
<td>TTS 5753</td>
</tr>
<tr>
<td>Per midwife</td>
<td>10120</td>
<td>Kupang 3824, Ende 24124</td>
<td>Manggarai 21959</td>
</tr>
<tr>
<td>Contraceptive prevalence</td>
<td>36</td>
<td>Alor 56</td>
<td>Kupang 26</td>
</tr>
<tr>
<td></td>
<td>TTU 57</td>
<td>Ende 25</td>
<td></td>
</tr>
</tbody>
</table>

Sources: Kantor Statistik, 1976–88. Figures for 1984 are derived from SUSENAS. Figures for 1985 are derived from SUPAS.
Social expenditure can be viewed in a number of different ways. Ministries of finance tend to regard social expenditures as basically unproductive, a residual item of public consumption. In practice, regardless of recent rhetoric, the amount of the national budget devoted to health, education and other aspects of social development is viewed from a welfare perspective, determined essentially by the amount of the national cake that is left over after other, higher priority demands have been met. Under this static approach, social development in poor provinces is limited by the rate of growth of national and regional income, and by the extent of higher priority demands on government budgets.

Individuals, by contrast, apparently regard some social expenditure, especially expenditure on education, as a form of private investment. Many parents in developing countries make large personal sacrifices to invest in the health and education of their children, in anticipation of future returns when the children obtain better-paid employment. The demand for social development as private investment depends on the level of private returns, which is ultimately determined by employment opportunities.¹

Advocates of a human resources development strategy for development argue that social development should be regarded as one of the most important kinds of public investment for developing countries. (Economic and Social Commission for Asia and the Pacific 1988). The quality of its human resources is perhaps the most valuable resource of any nation. The health, education, attitudes and even the happiness of the population are increasingly recognized as key determinants of participation in the development process and, therefore, of the level of national development. Particularly in developing countries, social development in the broad sense can thus be regarded as synonymous with human resources development. This paper will treat the two terms interchangeably.

Returns to the nation from public investments in human resources development/social development are obtained in two ways: directly, by improving the productive capacity of human resources, and indirectly,

¹The failure of families in certain developing countries to invest in the health or education of girls has been largely ascribed to low levels of female labour force participation.
to the extent that the consumption element of social development stimulates more (productive) human resources development. Some social expenditures, including most expenditure on education and much on health in developing countries, yield a direct return by improving the quality of a nation’s human capital. A healthy, well-nourished and well-educated population is more productive than an unhealthy, malnourished, poorly educated population. There is considerable evidence of both high private returns and substantial public benefits accruing from many aspects of social development.

Although social development may be regarded as a form of public investment, it is an attribute of the individual. It is individuals rather than the government who must make the appropriate investment decisions. Governments can build schools and hospitals and establish health clinics, but they cannot ensure that such facilities are effectively utilized. Low school enrolment ratios and poor utilization of health services in many developing countries suggest that the level of effective demand for health and education is much lower than policy-makers and governments have assumed. This arises because market imperfections cause substantial differences in costs among different population groups and prevent some from reaping the private benefits of their investments, and because the disparities between public and private returns may be considerable. Governments must therefore ensure the existence of sufficient incentives to stimulate individuals to make appropriate personal investment decisions. Private returns from the investment provide one kind of incentive. The purely consumption element of social development offers another. Private returns are largely determined through income gains obtained in employment and, in most developing countries, appear to be most effective in stimulating private investment in human capital.

Thus, employment policy and employment creation must be an integral element of a human resources development strategy, particularly in a poor country or province where employment opportunities may be limited. In East Nusa Tenggara, employment opportunities outside the agricultural sector remain quite limited. More than 80 per cent of the labour force was employed in the agricultural sector in 1985 (Kantor Statistik 1976–88 [1987 edition]:Table III, 4.8). The recent opening of the World Bank Polytechnic at Nusa Cendana was able to draw only about 60 per cent of its first intake from the province, apparently because parents and potential students considered that the
Part I: Background

The role of employment in providing the incentive for individuals to participate in human resources development creates a chicken-and-egg situation in a poor province. On the one hand, limited employment opportunities may be insufficient to encourage families or individuals to invest in health or education, and better-educated individuals may have to migrate to other provinces to find appropriate employment. On the other, the poor quality of human capital in the region may discourage the establishment of industries that could offer better employment opportunities in the future. This accounts for some of the apparent paradoxes that beset human resources development in poor regions. When regional institutions for higher education, such as the Nusa Cendana Polytechnic, are established in response to demands for regional human resources development, it should not be a surprise that a large part of the initial intake is drawn from areas outside the region with better employment opportunities, or when many of the first graduating classes have to migrate elsewhere (to Java) to find jobs. Human resource development is a long and slow process that must be integrated into all aspects of development. Short-run imbalances are inevitable and largely unavoidable. From this point of view, social development in NTT must be viewed from a long-term and the broader, national, rather than purely regional perspective.

The view of human resources development in NTT depends very much on the perspective that is adopted. Human resources development in NTT is somewhat higher than would be expected in terms of its per capita income level. Thus, a comparison with the national average (Table 5.1) is likely to underestimate the extent of unexploited potentials, and could even encourage a certain degree of complacency that such a poor province could achieve such high standards. For example, although NTT is one of the three poorest provinces, no less than thirteen other, mostly more affluent, provinces have higher levels of infant mortality. By contrast, the comparison with levels of human resources development in DKI Jakarta (Table 5.2), suggests that human resources development in NTT is particularly backward, and in need of urgent attention. The magnitude of the gap between the two provinces shown in Table 5.2 might engender a certain level of despair among policymakers faced with the daunting task of achieving human resources development with limited funds. A regional perspective (Table 5.3)
presents a picture that is at once more optimistic and more challenging. Despite the considerable handicaps, general poverty and backwardness shared by all kabupaten in the province (with perhaps the exception of the capital), some have succeeded in achieving relatively high levels of human resources development. The challenge for others is how to emulate those successes.

The perspective of human resources development that is adopted also affects the kinds of strategies that are advocated. A Jakarta-centric viewpoint is likely to emphasize large-scale expenditures on standard, nation-wide programmes that focus on the provision of infrastructures, training and development of labour. Such programmes typically rest on an implicit assumption that the level of demand for the services and training offered is high, both among the general population who are expected to ultimately benefit from the services offered by skilled workers, teachers, medical workers in new clinics, schools or hospitals, and among those who are to be so trained. They emphasize the targets to be achieved, rather than the problems to be solved. Considerations of equity require that the targets should be relatively uniform for all provinces. Thus, there is an inevitable tendency for a national perspective to lead to uniform national programmes.

The regional perspective presented in Table 5.3 places the effectiveness of this approach in some doubt. The level of effective demand may be too low to support the programme or, more importantly, to ensure equity and adequate coverage among certain target groups in its implementation. The incentives for individuals to undertake training may be too weak because there are few employment opportunities for skilled or educated workers; those who are trained may choose/be obliged to move elsewhere in order to reap appropriate private benefits from their investment; and the population may place relatively low priority on the services provided (for example, immunization, pre-natal care etc.).

The regional perspective raises the question of why some parts of the region have apparently responded to existing incentives and others have not. Differences in costs and incentives within the province and the role of non-economic factors in creating barriers to the creation of demand must be explored. More attention must be devoted to the simultaneous development of employment opportunities and creation of an effective demand for the services to be provided. This approach inevitably places the emphasis on the problems to be solved, rather than
the target to be achieved, and stresses the role of social and cultural factors in determining the level of effective demand and, ultimately, participation in the programme. While uniform national targets for human resources development should probably be largely retained, a regional perspective indicates the need for a variety of strategies adapted to specific local conditions in implementation.

The regional perspective also emphasizes the importance of integrating human resources development into all aspects of development in the province. Human resources development is not just about training and education. The central role of the employment and quality of life elements means that human resources development is multi-sectoral and multi-faceted, covering almost all development activities from water supply, health and nutrition projects to agricultural or industrial sector projects. It requires a high degree of coordination, cooperation and integration between line agencies during the implementation phase of a wide variety of development programmes. This is particularly difficult to achieve in Third World administrative systems that place most budgetary and decision-making power in the hands of centrally directed line agencies. The heavy coordinating responsibility borne by regionally based agencies, such as Bappeda in Indonesia, is rarely matched by a corresponding allocation of authority or resources.

In the final analysis, however, the justification for human resources development in a poor province must be seen in a national context. The costs of social development in NTT are well beyond the resources (current or likely to be available in the immediate future) of the province. In the short term, social development at the existing low levels will inevitably increase demands on the provincial budget and contribute little to regional revenues. Outsiders may take advantage of opportunities for human resources development in NTT that local people are reluctant to utilize, while local residents who do undertake human resources development may have to move to other provinces in order to obtain appropriate employment. This does not reflect any failure of human resources development strategies in the province, nor does it indicate that human resources development is not needed there. Failure to implement human resources development will certainly retard the development of industries and sectors that might ultimately provide appropriate incentives and employment to local residents. Human resources development in NTT must be seen as part of a national strategy, the fruits of which will ultimately benefit all provinces.
REGIONAL DEVELOPMENT ISSUES
6

APPROACHES TO REGIONAL DEVELOPMENT
IN INDONESIA AND THE NTT

Manuwoto

Background

Regional development planning as an objective of development in Indonesia must take into account two considerations: that the population and the natural resources of Indonesia are not evenly distributed, which gives rise to many imbalances; and that the market mechanism cannot be expected to reduce those imbalances in a short period of time, so government intervention is necessary (Indonesia 1988).

Regional development in Indonesia began in earnest with Repelita II, with the following objectives: to reduce the level of poverty in several regions where basic needs were not being met; to reduce imbalances of growth between one region and another; and to utilize the natural resources potential found in the regions to increase the prosperity of people in those areas in particular, and of the Indonesian people in general.

At the beginning of Repelita V, the poverty level in Indonesia was still high, although it had decreased considerably compared to the level of ten years before. At present, there are thirty million people below the poverty level in Indonesia. This poverty comes about because the method of land cultivation used is not suited to the physical conditions of the area, or the resource base is not sufficient to support the population of the area.

The substantial differences in economic development among islands are a major issue of regional development. Several economic and social indicators show that the islands of Java, Sumatra and Kalimantan as a whole are more advanced, compared to other areas in Indonesia. Further observation reveals that the differences in economic development among provinces are even greater. These imbalances are determined, among other things, by the presence of oil and gas and other
valuable natural resources, by the level of regional industrialization, and by macro-policies of previous times which have unintentionally affected the pattern of regional development in Indonesia.

The policy of protecting the domestic market from the effects of imports has favoured areas where concentration of industry is high, as well as those areas with international ports, remembering that the majority of intermediate goods and capital goods must be imported. Areas in Java, especially large towns, have gained a big advantage from such policies. On the other hand, the trade regime has meant that agricultural commodities and domestic industries which do not receive subsidies have not been able to compete in the international market because of an overvalued rupiah, which has hindered the development of the economy of a large number of other regions in Indonesia.

**Typology of regional development**

In order to see the patterns of regional development from a national perspective, it is necessary to construct a typology of regional development, which groups areas on the basis of similar characteristics. Several indicators can be used to make such a typology. In general, the indicators may be differentiated according to two groups: economic development and those concerned with social development. The economic indicators which are sufficiently practical to use here are the per capita income in a particular year, and the growth rate of per capita income during a specific period. The social indicators which may be used are the infant mortality rate per 1,000 people, the percentage of population below the poverty line, and the percentage of children of secondary school age attending school.¹

Using growth rates of Regional Gross Domestic Product (RGDP) per capita during the period 1975–84 and the rate of RGDP per capita in 1974, areas in Indonesia can be classified according to four groups: low growth and high income, high growth and high income, high growth and low income, and low growth and low income (Table 6.1).

From Table 6.1, it can be seen that a large proportion of regions (thirteen provinces) in Indonesia are in the group with low growth and low income. Only Riau and East Kalimantan, two oil-producing regions, are in the group with high incomes but low growth. North Sumatra, South Sumatra, and Jakarta represent the most advanced regions in

¹ This analysis of regional development typology is abstracted from Hill and Williams (1989).
Table 6.1: Typology of economic development

<table>
<thead>
<tr>
<th>Low growth</th>
<th>High growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>High income</td>
<td>High income</td>
</tr>
</tbody>
</table>

| Riau | North Sumatra |
| East Kalimantan | South Sumatra |
|        | Jakarta |
|        | East Java |

<table>
<thead>
<tr>
<th>Low growth</th>
<th>High growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low income</td>
<td>Low income</td>
</tr>
</tbody>
</table>

| Jambi | Aceh |
| Lampung | West Sumatra |
| DI Yogyakarta | Bangkuku |
| North Sulawesi | Central Java |
| NTT | West Java |
| NTB | Central Kalimantan |
| West Kalimantan | Bali |
| North Sulawesi | |
| Central Sulawesi | |
| South Sulawesi | |
| South Kalimantan | |
| Maluku | |
| Irian Jaya | |

Indonesia, with a high per capita income and high economic growth. In these three regions, the industrial sector is already more advanced, supported by an estate agricultural sector with steady growth (North Sumatra and South Sumatra), and a service sector (Jakarta).

The three large provinces of Java all show a rate of growth faster than the average rate of growth in other regions, as a result of the protective international trade policies discussed earlier. It is further easy to understand why small provinces outside Java which produce commodities of high economic value, such as Aceh, Bali and West Sumatra, experience high economic growth.
From the typology of Table 6.1, it is also clear that western regions in Indonesia are more advanced than those in the east. The regions which are identified as the most underdeveloped in eastern Indonesia exhibit different characteristics: NTB and NTT are regions that are poor in natural resources; Central and Southeast Sulawesi have limited human resources potential; while Irian Jaya has only comparatively recently embarked on the process of modern socio-economic development.

Using a similar approach in clarifying the typology of regional development from a social perspective, a very different pattern emerges. Three indicators have been used here: the rate of infant mortality to denote health (Table 6.2), the enrolment ratio at junior high school to denote education, and the level of poverty (Table 6.4). Only five regions (Table 6.3) are classified in the group with poor early health levels and low improvement of conditions (Table 6.2)—that is, South Sulawesi, NTB, NTT, North Sulawesi and South Kalimantan, whereas there are

<table>
<thead>
<tr>
<th>Table 6.2: Typology of development of health conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low improvement</strong></td>
</tr>
<tr>
<td><em>Good early conditions</em></td>
</tr>
<tr>
<td>East Java</td>
</tr>
<tr>
<td>Central Java</td>
</tr>
<tr>
<td>Central Kalimantan</td>
</tr>
<tr>
<td>Bali</td>
</tr>
<tr>
<td><strong>High improvement</strong></td>
</tr>
<tr>
<td><em>Good early conditions</em></td>
</tr>
<tr>
<td>Aceh</td>
</tr>
<tr>
<td>Bengkulu</td>
</tr>
<tr>
<td>Jakarta</td>
</tr>
<tr>
<td>East Kalimantan</td>
</tr>
<tr>
<td>Central Sulawesi</td>
</tr>
<tr>
<td>North Sumatra</td>
</tr>
<tr>
<td>Lampung</td>
</tr>
<tr>
<td>DI Yogyakarta</td>
</tr>
<tr>
<td>North Sulawesi</td>
</tr>
<tr>
<td><strong>Low improvement</strong></td>
</tr>
<tr>
<td><em>Poor early conditions</em></td>
</tr>
<tr>
<td>North Sulawesi</td>
</tr>
<tr>
<td>South Sulawesi</td>
</tr>
<tr>
<td>South Kalimantan</td>
</tr>
<tr>
<td>NTT</td>
</tr>
<tr>
<td>NTB</td>
</tr>
<tr>
<td><strong>High improvement</strong></td>
</tr>
<tr>
<td><em>Poor early conditions</em></td>
</tr>
<tr>
<td>West Sumatra</td>
</tr>
<tr>
<td>Jambi</td>
</tr>
<tr>
<td>West Java</td>
</tr>
<tr>
<td>West Kalimantan</td>
</tr>
<tr>
<td>Riau</td>
</tr>
<tr>
<td>South Sumatra</td>
</tr>
<tr>
<td>Maluku</td>
</tr>
</tbody>
</table>
nine provinces classified in the group of good early health levels and high improvement of conditions, of which seven are found in Sumatra, Java and Kalimantan.

Looking at the indicator of education levels (Table 6.3), there are no regions included in the group of poor early conditions and low improvement of conditions. On the other hand, there are only three regions classified as having good early conditions and a rapid rate of improvement—that is, North Sumatra, West Sumatra and East Kalimantan.

In contrast to the health indicator, in the area of education the two large provinces in Java are in the group with poor conditions but high improvement. This indicates that the effort to evenly distribute educational facilities at high school level across key regions has been largely

| Table 6.3: Typology of development of education conditions |
|----------------------------------|--|
| **Low improvement**              | **High improvement** |
| **Good early conditions**        | **Good early conditions** |
| Aceh                             | North Sumatra          |
| Bengkulu                         | West Sumatra           |
| DI Yogyakarta                    | East Kalimantan        |
| South Kalimantan                 |                           |
| Central Sulawesi                 |                           |
| North Sulawesi                   |                           |
| Maluku                           |                           |
| South Sumatra                    |                           |
| Jakarta                          |                           |
| East Kalimantan                  |                           |
| North Sulawesi                   |                           |
| South Sulawesi                   |                           |
| NTT                              |                           |
| **Low improvement**              | **High improvement** |
| **Poor early conditions**        | **Poor early conditions** |
| Riau                             |                           |
| Lampung                          |                           |
| Central Java                     |                           |
| West Kalimantan                  |                           |
| NTB                              |                           |
| Jambi                            |                           |
| West Java                        |                           |
| Bali                             |                           |
successful. From the aspect of poverty (Table 6.4), it can be seen that only two regions are classified as having poor early levels of poverty and low improvement—that is, NTB and NTI. Besides these two regions, there are concentrations of poverty in Central Java, East Java and Yogyakarta; however, in these regions, with their high improvement, the decrease in poor population is faster than in NTB and NTI.

Inspecting the convergence level of the four economic and social indicators, we find that there are no large imbalances between one area and another, except in poverty levels. There are also concentrations of poverty in the transmigration area of Lampung, and in a large proportion of the regions of eastern Indonesia, especially NTB, NTI, Maluku and Southeast Sulawesi.

The social development of a region is clearly not correlated to its economic development. Thus several regions which have good social development appear to have a low level of economic development. By contrast, there are several areas which are relatively advanced economically but exhibit low social indicators. This situation requires a strategy of regional development that is more specifically addressed to a particular

<table>
<thead>
<tr>
<th>Low improvement</th>
<th>High improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good early conditions</td>
<td>Good early conditions</td>
</tr>
<tr>
<td>Riau</td>
<td>Aceh</td>
</tr>
<tr>
<td>Central Kalimantan</td>
<td>Jambi</td>
</tr>
<tr>
<td>East Kalimantan</td>
<td>South Sumatra</td>
</tr>
<tr>
<td>Bali</td>
<td>West Java</td>
</tr>
<tr>
<td>Lampung</td>
<td>West Kalimantan</td>
</tr>
<tr>
<td>South Kalimantan</td>
<td>South Sulawesi</td>
</tr>
<tr>
<td>Central Sulawesi</td>
<td>North Sumatra</td>
</tr>
<tr>
<td>Maluku</td>
<td>Jakarta</td>
</tr>
<tr>
<td></td>
<td>Bengkulu</td>
</tr>
<tr>
<td></td>
<td>North Sulawesi</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Low improvement</th>
<th>High improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor early conditions</td>
<td>Poor early conditions</td>
</tr>
<tr>
<td>NTB</td>
<td>Central Java</td>
</tr>
<tr>
<td>NTT</td>
<td>DI Yogyakarta</td>
</tr>
<tr>
<td></td>
<td>East Java</td>
</tr>
</tbody>
</table>
area, so as to overcome simultaneously the various problems which arise there.

Obstacles to development in NTT

The first problem faced by the province of NTT is structural poverty, which means that people are unable to fulfil their basic needs, in terms of productivity, consumption power, and the availability of basic commodities. Structural poverty is caused by such factors as limited natural resources, geographical isolation, the lack of a basis for industrial development, and the low level of absorption of labour in non-agricultural sectors, as well as socio-cultural constraints.

The agricultural sector of NTT cannot be developed as productively as other regions because of its dry climate and long dry season as well as its limited irrigation infrastructure. The shifting method of land cultivation which ruins the ecology is still carried out in places. At the same time, land use potential that does exist, such as in the uplands, is not utilized to an optimal level, while in other places the land is over-exploited because of high population density. The physical and climatic conditions, as well as the kind of technology used in land preparation which is not appropriate to environmental conditions, can significantly influence the outcome of efforts to raise living standards.

The second main constraint is NTT's isolation from centres of production and distribution, both at a national and a sub-national level. This is reflected in the higher cost of shipping services in NTT compared to other regions. As a result, the cost of living is greater, and the growth of the economy is not as rapid as in other regions.

Another obstacle to regional development in NTT is the lack of a strong basis for industry. The absence of a basis for the growth of a strong manufacturing sector can be identified in the lack of a sufficiently large concentration of people; the location of the province far from the national centres of growth; and in a small population (around three million) with a low per capita income (around Rp235,000 in 1986, which was less than half the average national per capita income). This population is also scattered across three large islands and a number of small islands.

---

2 Many studies have reached these conclusions, including that of Lorraine Comer (1988).
At the same time, the secondary and tertiary sectors are unable to absorb the high growth of the work force in NTT (the population growth rate in NTT from 1985–88 is estimated at 3 per cent per annum). In 1985 only 18 per cent of the population in NTT worked in these two sectors, compared to NTB with 42 per cent, or the national average which was 58 per cent. The level of education which is relatively high in NTT (due largely to the participation of religious institutions) has not yet been reflected in more dynamic economic activities.

A regional development study for eastern Indonesia cites a community in Sumba with a social structure such that change from the outside appears difficult to implement, yet with a potential for the cultivation of food crops and animal husbandry that is very high (Departemen Pekerjaan Umum dan Canadian International Development Agency 1977). If this is true, then development efforts here must take into consideration socio-cultural aspects more carefully.

Regional development efforts in NTT must also be related to that region's ability to absorb development activities. Thus one Bappenas study shows that a large proportion of the development budget allocated to the regions of eastern Indonesia appears to benefit Java more than the eastern Indonesian regions themselves (Indonesia 1987).

Some thoughts on the development of NTT

In line with the results of studies into regional development analysed in the previous section, the central government's policy of regional development in Repelita V is to orient the development of all sectors towards the east. This is to reduce the level of poverty which has become critical in this region, to provide employment opportunities, and to fulfil the basic needs of the local population.

In the context of NTT, that policy means not employing strategies of development which pursue economic growth in the short term by giving priority to sectors yielding immediate economic returns in regions which are already growing rapidly and have social groups who are most able to take advantage of opportunities provided. Rather, the strategies of development in NTT must be oriented towards involving all sectors, regions and social groups in all aspects of the development process. For this, sectoral activities must be focused on the diversification of small-scale agriculture in regions which are underdeveloped but have potential in natural as well as human resources. These activities
should involve as much as possible the groups of landless people or small farmers in the rural areas, as well as those who work in the informal sector in urban areas.

NTT has potentials in natural resources which can be exploited to raise the income of the population. As already mentioned, efforts to exploit the existing resources are blocked by the problem of the region's isolation. Opening up NTT, therefore, is a prerequisite to its further development. The development of human resources through education which is more focused on increasing skills in exploiting local natural resources and in efficiently managing those activities, is another prerequisite. If these aspects can be implemented, then efforts to speed up the economic growth of NTT will be more meaningful. Research into the economic and geographical potential of NTT reveals several opportunities which are open for development of the region.

The tourism sector of NTT holds bright prospects, with NTT's many unique natural and cultural features, such as the rare *komodo* dragons, beaches, coral reefs, archaeological sites, and local culture. The development of the tourism sector could be very beneficial to the local people by increasing employment opportunities in the foodstuff industry, restaurants and hotels, and cultural services.

A sphere which has not been exploited to its optimal potential is the livestock sector. This has long enjoyed a high comparative advantage, and is worth retaining considering the extensive grazing land available. The consumption of meat, eggs and milk will increase in line with rising incomes. To prevent further environmental damage, the process of developing the livestock sector must incorporate the use of technology which is adaptive, both in the development of water sources as well as in animal husbandry practices. The further development of the livestock sector can indirectly raise the incomes of the rural population.

The intensification of agriculture can be continued by using arable land that is still available. Productivity of food crops can be increased by increasing the productivity of the land. *Palawija* crops, which until now have been neglected, need to take priority, considering that demand from within the region itself is not yet being met.

Apart from intensifying land cultivation with crops that are commercially viable, and implementing a farming system that takes into account the capacity of the environment to support it, there needs to be a movement of population from areas that are densely populated, or
from regions that are in a critical condition, to areas that are sparsely populated but suitable for development under agriculture.

To overcome the isolation of the region, road-building in NTT is essential. The road network system which exists today is inherited from a colonial era and does not support the acceleration of development. For this reason, road development should be directed towards opening up areas which have potential for agriculture and rural industry, thus allowing rural centres to transport their products out of the region easily and cheaply.

All these development activities must be linked so as to create a direct impact in the most efficient way. Hence regional planning of the NTT region has a crucial role in the success of development. The strategy of such planning should be to gradually integrate the rural and urban centres in this region with the larger centres in other regions, especially Denpasar, Surabaya, Ujung Pandang, and Darwin.
Introduction

In these discussions on identifying the socio-economic potentials for regional development in Nusa Tenggara Timur (NTT), I have been instructed to present some ideas on the questions of regional policy. In my opinion, regional issues and policies should be discussed, understood and implemented in the territorial (daerah) development context with a regional (wilayah) perspective. By using the term ‘territorial’ I refer to an administrative territory incorporating several regions, while by the term ‘region’ I refer to a geographical unit possessing specific characteristics. Regional policy needs to be discussed with three considerations in mind. These are as follows:

First: A constitutional consideration for regional policy is based on the Constitution (section 1, article 1), which states that: ‘The Indonesian State is a Unitary State in a form of a Republic and comprises all of the Indonesian Nation, one Nation State, and a regional territory is only a subsystem within this Unitary State.’ (McBeatts and Boyle 1990:20) This implies that regional development must be conceptualized within that ‘One Nation Statehood’. A regional development policy for NTT has to be considered in this context, where NTT is an ecosystem which consists of relatively small islands separated by fairly wide seas and straits. The ecosystem of NTT can be said to be a mini-replica of Indonesia itself.

Second: The ecological setting is another basis for consideration in regional policy. NTT lies within a semi-arid climatic zone, which has the following characteristics:

1. An unpredictable climate which does not provide certainty for the cultivation of seasonal food plants.
2. Dry seasons which tend to be relatively longer than rainy ones.
3. Changeable weather and other climatic characteristics which have a great influence on the weathering process of stones. This in turn causes great variability and affects the conditions of the topography, morphology, land and the mosaic pattern of vegetation spread.

All these characteristics project an environment of 'micro ecological niches' or recesses, which considerably influence the pattern of farming activities of the NTT people.

There are no large-scale farming areas in NTT. In general, farming areas tend to be small-scale and scattered, such that the pattern of settlement is also small and scattered.

What are the relevant regional ecological issues within the context of regional development policy? They are a combination of the facts that NTT consists of relatively small separated islands and that it possesses a 'fragile' ecosystem which implies that its management must be carried out with care and farsightedness in a similar way that one manages a set of expensive crockery. Again, from the viewpoint of development ecology, NTT is a combination of ecological micro-niches which have been inhabited by a number of ethnolinguistic groups from ancient times. These groups have their differences due to language and the tendency to hold on to their traditional values.

We should embrace the 'handle with care' attitude when dealing with the fragile ecosystem of NTT. This is not only in the management of its natural resources to avoid environmental and savannah destruction, but also to avoid a socio-political catastrophe through 'man-induced fragility'. In addition, such a style of management can also prevent disunity, which can be induced by some people with 'primordial' attitudes and tendencies to mix only within their own language and religious groups.

Eliminating such negative consequences needs a leadership with a national and state perspective in the sphere of government, development and politics. Social tensions which often happen in the administration front often can be attributed to a 'leap-frogging' process from one small niche to another.

Third: Regional policy also needs to be discussed from a developmental approach which rests on concepts of (economic) growth and (fair income) distribution. Thus:

1. The spatial structures which are made up of small or scattered settlements can cause inefficiencies due to high economic costs (of
transportation). What is needed is economic growth which can be obtained by increasing efficiency.

2. In order to bring about a wider distribution of the results of development programmes and to achieve prosperity for all, we must follow the principle of effective distribution from main centres of growth. However, the realities of the above spatial structures have hindered the proper functioning of this effective distribution.

General issues

The main question at present is what type of regional policy needs to be developed to deal with the typical NTT regional setting, and which policy in particular will come to terms with the fragile components of the island savannah ecosystem.

A clarification of what is meant by 'regional policy' is necessary. Regional policy is also a 'spatially oriented policy' which deals with geographical development as a partner to sectoral development. As such, regional development has two different dimensions: (a) the spatial dimension; and (b) the sectoral dimension.

With regard to the spatial dimension, the Constitution (No.5 of the year 1974, sections 80 and 81) has underlined that this is a responsibility of regional government. I am under the impression that many people are fairly confused about the two dimensions of regional development, and act as if regional development is only to be equated to sectoral development. Thus people in the regional government circles often tend to concern themselves more with sectoral issues than spatial ones.

Spatial understanding includes not only the components of land, human settlement and a cultural support system but also the institutional setting. In respect of culture, it is generally known that culture is a product of the interaction between people and their environment. In other words, culture here is a concept created by people to understand their physical surroundings. For the people of NTT in particular, who call themselves Atoni Pah Meto (meaning 'people with dryland culture') as a result of living with a dry climate, their creation of farming models and system of mixed farming technology suits the dry ecosystem. Such a mixed farming system is aimed towards food security, given the uncertainty of the variable dry climate.
It is the duty of the experts in the field of agriculture to introduce various models of farming technology which fit the particular sociological, economic, financial and ecological requirements of NTT.

Therefore regional policy should have the breadth and content to cover:

1. The regulation of spatial structure and pattern of land settlement.
2. The existing cultural potential (which can act as a source of internal dynamics) as well as the existing sources of external dynamics. All these aspects can be utilized for regional development.

These various facets of regional policy are aimed toward the above-mentioned goals of the developing regional structures with a national perspective, through a process of interdependence and regional integration in the form of mutual cooperation in trade and other areas. Transportation planning can also create a convergence between efficiency on the one hand and economic growth and fair distribution on the other.

**Examples of the realities of spatial and sectoral linkage**

While regional government can concern itself with sectoral development, it must remember that it is equally responsible for spatial allocation in ensuring a well-ordered structure, including land settlement structure.

To clarify this idea, I bring forward a number of examples, all of which concern regional integration supported by inter-module transportation planning.

**Example 1**

At present, a quay is being constructed in a place called Marapokot on the north coast of Flores Island in the subdistrict (kecamatan) of Aessesa, and in the district (kabupaten) of Ngada. (Figure 1.1). There are two other harbours (without quays) in the southern part of this district.

The Marapokot quay can dock ships with deadweights of 2,000–3,000 tonnes. Is there a guarantee that there will be a payload which will sufficiently meet a profitable load factor if the ship owners rely solely on cargo coming from or to the subdistrict and its surrounding areas? I am certain that there is no such guarantee.
Some parochial attitudes which stand in the way of spatial integration need to be discarded. Certain areas in the Manggarai district which are closer to Marapokot than to the Manggarai district harbour of Reo need to be integrated with other areas within the Ngada district, and can be serviced by Marapokot.

Such spatial integration for the purpose of growth efficiency and fair distribution can transcend regional administrative borders. The above integration process must be supported by a transportation pattern and road network which enables the whole region to be accessed from Marapokot.

Therefore regional integration, with the purpose of accessibility to a particular port or quay, provides a role for inter-module transportation. Such a role could be realized within the framework of regional development meetings (rakorban—rapat koordinasi pembangunan).

Example 2

One can visit the district of West Sumba and find that the local regional government is very concerned about the port and quay of Waikelo (Figure 1.1).

Sumba island is made up of two districts, East and West Sumba. In East Sumba there is the port and quay of Waingapu. The load factor of ships that dock at this port in each year is about 0.4, which is about the same as the smallest load factor at ports on Madura island and therefore far below the break-even point (b.e.p.).

Inefficiency at the micro level flows on to the macro level. In Example 1, we have observed the situation where parochial thinking still pervades in people's minds, such that they are not willing to know what is happening in a neighbouring district. Again, in this case, it would be better for the West Sumba district with its various surplus commodities to use the Waingapu port, which is already connected to a network of roads. As this practice is further stepped up, the vehicle-operating costs would be reduced.

In this manner the load factor of ships that dock at Waingapu could be increased to become more profitable. Indeed, ships that visit Waingapu generally need to have a relatively bigger deadweight tonnage as they have to travel across longer ocean routes and wider straits. to get to Waingapu.
Example 3

In the Fourth Five-year Plan (Repelita IV), the 'agro-complex' concept has been developed as an analogy to the 'industrial complex.' The basis of such an agro-complex is that districts with a similar agro-climate should be integrated into one unit, even though these districts are separated by boundaries of government administration. An example is the agro-complex of Kapan–Eban, which is situated within the South Central Timor and North Central Timor districts.

With the existence of this agro-complex, all facilities can be provided efficiently, including processing and marketing facilities. The road network which connects this entire complex is already in existence. And since the largest provision of processing and marketing lies in Kupang, most of the network goes through Soe (the capital of South Central Timor) and back to Kupang.

In this situation, the agricultural produce of Eban in North Central Timor district no longer needs to be transported to Kefamenanu, the capital of North Central Timor district, because it would be further to transport it this way to Kupang while the amounts to be transported also tend to be relatively small.

Integration of village and urban development within regional development

One purpose of the discussion in this book is to identify key sectors which when developed can have a multiplying effect on the rest of the economy.

The report from a field study conducted jointly by Mercu Buana University (MBU) and the Australian National University (ANU) has made a number of recommendations regarding the order of priorities of industries to be developed in NTT (see Barlow et al 1990:100, Appendix II).

In this order of priorities, the tourist sector has been selected as second after the agricultural sector. If we limit ourselves to look at these two sectors alone within the context of spatial economic development, we can observe the existence of two-way linkages between towns (with which the tourist sector is generally involved) and villages (with which the agricultural sector is generally involved).

The improvement of the tourist sector will have a spreading effect, insofar as it strengthens the demand by town people for agricultural
products. In turn, with a greater income for the rural population, there will be a greater demand for products from the cities.

The exchange of trade between towns and villages will be mutually improving, as there will be interdependence and symbiosis between towns and villages. This will of itself strengthen the unity of the nation and country. With the development of the tourist and agricultural sectors, an effect will be felt on general economic activity. As previously mentioned, the economy of NTT is a small-niche economy, and here profits can be made in the tourist sector. But this depends on developing the sector by utilizing the existing ‘amenity resources’, and by exploiting their comparative advantage.

Surely the three-colour lake of Kelimutu in Ende, the *komodo* dragon, the *ikat* weaving and other features of culture in NTT can compete with amenity resources in other areas? However, what is not yet certain is the amount of facilities which can be provided for tourists.

Within the context of the development of towns and villages in regional development, we need a leadership which has a wide conception about regional development.

I still remember the opinion of Perroux and Myrdal, which was endorsed by Hirschman, and which says:

Economic progress does not appear everywhere at the same time and that once it has appeared, powerful forces make for a spatial concentration of economic growth around the initial starting points. (Hirschman 1967:87)

As a consequence of my own personal experiences in regional development, I am not in complete agreement with this view. However, this view has been used as a working assumption in regional planning in all regions within the first (district or *kabupaten*) level of NTT.

On the basis of this view, a new concept has been developed which is based on the Regional Development Unit (*Satuan Wilayah Pembangunan*—SWP). This is a spatial unit that can cut across administrative boundaries), and is supported by another concept which is based on establishing centres of growth. However, the following question must be asked: Are these two concepts compatible? Are the village communities within a SWP fully aware of the opportunities offered by centres of growth? Similar questions can also be asked in more concrete terms—for example, would there be any micro-dynamics at the village level which can utilize the opportunities that come from outside the villages?
Other aspects

In NTT approximately 60 per cent of villages already have a Budget for Regional Needs Development Projects (or Anggaran Proyek Pembangunan Keperluan Daerah—APPKD). What does this indicate? Is this not a result of influences which are ‘top-down’ in nature? What internal micro-dynamics are they based on? If they exist due to top-down influences, I feel that the progress we are currently experiencing can only be temporary in nature, and that when the top-level bureaucracy weakens what we have proudly achieved will disappear.

It is therefore important to find the internal dynamic factors within village communities, and then work with them. However, the difficulty lies in the fact that many original institutions in the villages in NTT have been eliminated since 1965. If they are still in existence, we can manipulate them and find a concordance with the new institutions of development. These new institutions were mentioned by the Constitution No 5 of the year 1979 as those institutions which ‘have not made their cultural roots’ while the ‘old institutions have disappeared’ (Indonesia 1979).

Thus the strategic issues of village development in NTT may not only be revolving around the economic questions outlined above, but could be more influenced by issues of institutional setting. There is another assumption in village development that the stronger the institutional foundations in a village, in terms of its ‘receiving’ and ‘delivery’ system, the greater the chance that village has in improving its income. Without an improvement in the abilities of receiving and delivery systems within village institutions, there can be no hope for interdependency and reciprocity between towns and villages. On the contrary, a process of dependency and exploitation of villages by towns could cause rural poverty, which in essence would be contrary to the national aspirations of Indonesia.

Therefore, we must strive towards a village development model where the institutional and productive components of the village are being developed together. What is desirable in village development is a mutual symbiosis between town and village, and not a situation where towns function on a parasitic basis vis-à-vis the villages. At the starting point, concentrations of urban economic development cannot be avoided, but parallel institutional development in the rural areas also needs to be considered.
Another recommendation of the joint MBU–ANU study is for the processing sector to be given the third priority in industrial development (Barlow et al.: 55). In this context, and with reference to the integration of towns and villages, I am of the opinion that we need to develop the concept of ‘propulsive industries’. In essence, this concept means that rural industries are assigned to process raw materials to semi-processed forms, which then become intermediate inputs for processing industries in urban areas.

Development of such processing industries should be supported by an educational system which enables village community to take a more active and positive role within the processing industries in the rural villages. A smooth transportation system needs to be developed, so that the flow of raw materials and partially processed materials to the urban areas for further processing, and the marketing system involved, can be made more efficient.

Conclusion

Uniformity of policies within a region with great dissimilarities, such as NTT, will only create losses from the distributive point of view. The government cannot formulate its policies with the assumption that similar areas would have similar needs, but should formulate them according to what is needed. Such uniformity can also mean a lack of attention on a particular group which could well be encouraged to perform a dynamic role in development. Decentralization is needed but it is also hoped that this will bring about opportunities for (regional) social, political and economic integration. This can occur if the decentralization process is not accompanied with parochial attitudes. The granting of decentralization must be accompanied with concepts of one nationhood and statehood, which in essence is the meaning of regional development with a national ideal.

I am in agreement with those who believe that the head of the subdistrict (or kecamatan) regional government (whose area in our national system has been determined to be the Basic Working Developmental Unit—Unit Dasar Kerja Pembangunan [UDKP]) should be given authority free from a higher level, bureaucratic intervention (bebas tantra) in their decision-making processes. In this way the stage can be set for decisions to be in accordance with the real needs of the local
people, within the general framework that has been outlined in the national system. From the point of view of manageability, it is appropriate that subdistrict government regions be assigned as UDKP, since they are neither too big nor too small and also often comprise one 'historic community'.
Introduction

In general, the level of advancement of regional development between the twenty-seven provinces of Indonesia is not uniform, because:

1. The situation and condition of natural resources, human resources, capital, information and technology varies, and can even be vastly different.

2. The starting points in time of regional development efforts deviate, so that in the development race in Indonesia some provinces reach a good standard quite rapidly, while others are still far behind.

3. From the point of view of ‘development management’ in the regions, the backgrounds in discipline and experience of the leading actors are also different, with the result that in the past styles of management have been more conspicuous than the technical and professional capabilities of those involved.

With this background I will try to analyse my experience as one actor in development in a particular province, without any pretensions whatsoever and realizing that the situations and conditions of provinces in Indonesia are varied, if not completely disparate in many respects.

West Sumatra was a province which in 1966 was still very underdeveloped, especially in terms of government and physical infrastructure, with the prevailing mental attitude of the community being apathetic towards the concept of ‘development’. Thus the experiences of efforts by the leaders of regional development to create a ‘mental switch’, orienting people towards development of their own local community,
may be interesting as a case study. Local cultural factors proved very influential on attitudes of people to development.

**Political climate and security before 1966**

These days, the meaning of 'development' (including within it the concept of 'development of a region's economic potential') is generally understood by the Indonesian government apparatus, as well as by the community. But the perception of how it is to be implemented can vary within the various social groups which are spread across the provinces, especially those in hinterland areas.

The development process, which is aimed at improving the status of the general population of Indonesia by attempting to eliminate poverty and imbalances in standards of living amongst groups in society, operates in the dimensions of time, space and the mental development level of the communities involved. In order to understand development in an administrative region such as West Sumatra, one needs to look at how it came about and at changes in the way it was perceived and understood.

Right through the time that the Netherlands East Indies was occupied by the Japanese army from 1942, and continuing through the independence struggle of the Indonesian people against the Dutch which lasted until 1950, the political meaning of development, as it is understood now, was not in the dictionary of the Indonesian nation. The slogan 'Pembangunan' (Development) was still foreign to society.

Previous to the G30S/PKI rebellion in 1965, West Sumatra province was beset by regional upheaval, which began in 1958 and which is known as the PRRI movement. Here the leaders of certain political organizations supported by several local armed forces units rebelled against the authority of the central government. The efforts by the central government and its apparatus to normalize the situation took five to six years.

After the upheaval of 1958, nearly all the physical infrastructures of Sumatra, such as state, provincial, kabupaten and village roads, etc. were either in ruins, or in a critical condition. The same applied to the condition of bridges and irrigation; almost everything was damaged or in a condition of neglect. During the time it took to extinguish the disturbance, government policy (both central and regional) was focused on the restoration of a normalized situation through the Hankamnas (National Defence and Security Establishment).
Meanwhile, the central government apparatus in the region and the regional government itself were not functioning, because government officials and their employees had either been implicated in the rebellion or had fled to other places. In other words, the mechanisms of government and physical infrastructures needed repairing before a comprehensive development policy could be implemented.

After normalization of the security and political situation had been achieved in mid-1965, another disturbance arose, the G30S/ PKI rebellion, which again delayed the development efforts of the Indonesian nation, including the province of West Sumatra, for many years.

Only after the GBHN (Broad Guidelines of State Policy) had been announced by the MPR–RI (People's Consultative Assembly) in 1968 did the Indonesian nation enter the era of planned development, although still simple in its form, system and methodology.

Strategic steps taken towards entering the development era

A strategic step taken by Pemda West Sumatra in 1966 (before GBHN and Repelita were known) was to organize an inventory of the major problems facing it and the West Sumatran people. In the political climate and security situation explained above, the inventory of problems was carried out by the Pemda apparatus, together with experts from Andalas University in Padang. After the results of the inventory were known and processed, the next step was to strengthen and place personnel with technical education backgrounds who had specific expertise. This was done by organizing a ‘tour of duty’ of several Pemda core officials, and by recruiting recent graduates of Andalas University and other universities. The main purpose of the West Sumatran Pemda was to create a common way of thinking and a synchronized movement between the ‘top decision-makers’ and the technical ‘implementers’ at the lower echelons of government.

Realizing that in the 1960s the government did not yet have sufficient funds for development, Pemda took the attitude of embracing and encouraging the population down to the village level to participate actively and take a role. They were to use all the funds and resources they had to build their own homeland, through emergency efforts to repair the physical infrastructure which had been seriously damaged.

This community participation was established by approaching the group of leaders whom the people followed and listened to—in particular the ulama, the religious leaders or traditional leaders, and the teachers
(called cendikiawan, the intellectuals or educated class). In West Sumatra these groups are called Tigo Tungku Sejarangan, or three groups whose functions differ in the community but who are united in their basic aim. This is to foster their ‘nieces and nephews’ in society towards improving their physical and spiritual life.

This approach of embracing such ‘social leaders’ has proven very effective, with the result that many development projects in rural areas and in towns have been run cooperatively with them under the leadership of government officials from the technical agencies concerned (such as agricultural extension, livestock extension, and public works). Often the value of a project built cooperatively has been up to ten or twenty times of that value had it been let to private contractors.

The appreciation of these ‘social leaders’ by Pemda was in the form of a ‘recognition of their status’ by the government apparatus, as a group of people who were venerated or were otherwise considered especially wise and intelligent. Hence at every community meeting their presence was noted and valued, so that their ‘sense of belonging’ in the development process was enhanced.

In the ensuing development process, when changes in community mental attitudes were required to meet challenges brought about by the process itself, these were accepted by those social leaders. Nevertheless, some issues such as the use of traditional land or tanah ulayat (land belonging to the general community) for development project needs became problematic, because approaches by irresponsible elements of the State apparatus were not appropriate to local cultural patterns.

Another factor which accelerated the process of development was the role and function of Bappeda. After 1966 the position of head of Bappeda in West Sumatra was always entrusted by Pemda to an expert recruited from Andalas University. Relations with experts in various universities were nurtured well, because they represented the source of valuable feedback and data for regional planning. Also, it was an important motivating factor to include these intellectuals in the process of developing their own homeland. The majority of Bappeda Level II staff consisted of graduates of local higher education institutions.

Bappeda at Levels I and II, apart from its function as a ‘think-tank’ and motivator, also functioned as coordinator of development projects, both national and regional. This fact later fostered a feeling of ‘self-worth’ in the community, by creating the image that development efforts were from the people and for the people in that particular locality.
In this way the 'community will' and scale of priorities in the use of local socio-economic potential was more easily determined, so that it would be harnessed in future projects. The offices of the Wali Negeri and village head could also function as local headquarters for development efforts. Here again, the role of 'social leaders' in meetings concerned with rapat adat and in discussions with the village heads represented 'social participation', which was very beneficial because it was those leaders whom the local people had always respected and followed.

A policy that Pemda began in 1966, in the framework of creating active coordination amongst parts of the government apparatus between the staff of Pemda Level I and Pemda Level II, between local offices and representatives from central government departments, between the deputy heads of government banks, and between state officials and social leaders, was to involve all elements of the government and the community in a general coordination meeting. This was held once a year in the Pemda Level II capitals, in rotation. Here the emphasis was not only on active and direct communication between separate parts of the government apparatus, but also on a clear interconnectedness between the work programmes of each government department. This was done by synchronizing the flow of the Daftar Isian Proyek, ensuring that the authorization of each of the budgets was at the appropriate moment.

At the same time as the coordination meeting, a display of photographs and agricultural products, handicrafts, etc. was held for the local people by the particular Level II hosting the coordination meeting. This was to stimulate social participation and the feeling of sharing direct responsibility in development.

The general coordination meetings, which were rather more lively than was customarily the case, were always followed and given attention by the general community. The psychological influence of coordination was very important, because the participants of the meetings could learn much from listening to the experiences of those in other Level II areas.

Another benefit of the coordination meetings was that on the last day (usually Day 3), all participants visited several development projects which were considered successful and which were a matter of pride for the hosting Pemda Level II. This field trip was always led by the governor, and at the sites visited 'on the spot' discussions were held between the government officials (who were participants of the meeting) and the local people who flocked to the project site.
Coordination meetings such as these inspired the regional Level II heads to subsequently try to increase development successes in their own regions. The benefit for the governor was that, apart from receiving a written report, these field visits represented a physical inspection of the Level II region.

The government banks and heads representing the central government departments in West Sumatra were also obliged to participate in the coordination meetings. The advantage for them was that they were able to hear about the programmes of each government department, and could see for themselves—'on the spot'—the potential for effective bank assistance or loans.

In summary, the rotational Level II coordination meetings were very useful for all parties involved, because both policy and implementation parties could meet together in an operational setting in the field, and secure feedback which was very useful for all participants in planning the work programmes for the following year.

Gradually information about the planning, monitoring and evaluation of the development process was built up. Also in these coordination meetings the general objectives of the central government's planning and programmes, as well as the specific objectives of Level II regional government planning, were analysed. Again, the extent to which the abilities, strengths and funds of the community could be mobilized and projected for the annual budget for the following year was discussed and socio-economic potentials which had previously received little attention began to be given more prominence.

Other aspects

The proposed target group in the initial stages of rehabilitation of community development was the rural population.

The priority in physical development was placed on breaking through the physical isolation between Level I and Level II capitals, and between kecamatan and village capitals in the hinterland, by repairing roads and bridges as well as rectifying small public irrigation.

Cooperation with foreign parties in this case entailed collaboration between the Level I regional government of West Sumatra and the West German government with its apparatus called Deutsche Gesellschaft Für Technische Zusammenarbeit (GTZ). During the 1970s this helped to increase the skills of implementers in the regional gov-
Zain: Development in West Sumatra

emment apparatus, especially in branches dealing with methodology and techniques of planning and monitoring. In the context of this cooperation, the GTZ helped Kabupaten Pasaman in West Sumatra with development of knowledge and techniques of planning, as well as with implementation of development in Level II. This was undertaken by assigning a number of experts to fields such as planning and scientific disciplines such as agriculture, livestock, estate agriculture, and fisheries.

Besides studies and surveys of the socio-economic potentials of this Level II kabupaten, farmers and small craftspeople were supported through the credit assistance approach in cooperation with Bank Pembangunan Daerah (the Regional Development Bank). There were also pilot projects carried out for various types of rural economic activities which could easily be replicated by neighbouring rural communities. For example, there were pilot projects concerned with maintenance and development of sawah and ladang produce. Similarly, there were pilot projects in tree crops such as cocoa, pepper and coffee, and in small and large-scale livestock concerns.

The West German team of experts had an office in the Bappeda Level I building, and their staff were spread out at the kabupaten level so that they could work together on a daily basis with officials in the field as well as the various agencies involved in the cooperative effort.

To guarantee continuity in this cooperative venture, the Level I regional government sent a number of technical staff, including those from the Regional Development Bank and from the Governor's Office as well as from the kabupaten office, to West Germany for training in various fields for approximately six months. Such staff were sent together as a team, not as individual technicians.

Gradually this cooperation produced good results, so that the Level I government instructed the technical staff and other Level II regional governments which were not directly involved to send their technical staff in turn to Kabupaten Pasaman. This was to emulate the system and the methodological approach to rural development, which they considered could also be applied to other Level II areas.

Slowly, Kabupaten Pasaman, which was previously on of the most underdeveloped areas, became a kind of ‘rural economic development laboratory’ for the entire region of West Sumatra.

One aspect which facilitated communication between the West German team and the Indonesian parties involved was that all the West
German experts were sufficiently fluent in the Indonesian language. Also, the regional government continually encouraged the Indonesian officials (both Levels I and II) to draw on the experience of the foreign teams; it was emphasized that a transfer of know-how and technology was essential. The regional development policy of Pasaman was still determined by the Level I regional government, however.

Implementation of development since the GBHN was formulated

In the era before GBHN and Repelita, development policy in West Sumatra was influenced by a ‘commonsense approach’ involving ‘trial and error’, and assisted by a ‘psychological approach’ towards society which at that time was suffering trauma as a result of the local rebellion which had previously occurred.

In its efforts to restore and improve the attitude and mentality of the people, the regional government used the slogan ‘Raise your self-respect’ as a way of trying to motivate the participation of West Sumatran society in the development movement. The pattern of leadership in West Sumatra, after the era of Repelita was announced, gradually emerged as a ‘scientific approach’ towards addressing and overcoming the problems of underdevelopment, lack of education, and poverty which were still prevalent, particularly in the economically poorer areas and the hinterland. The concept of the ‘basic needs approach’, focusing on target groups such as those living below the poverty line, as well as integrating sectoral and regional projects, started to become the basis of thinking of planners and regional government officials. Through the fostering efforts of the government apparatus at the central level, all lower echelon officers at the provincial and regional levels received training to upgrade their technical skills in their respective departmental fields and organizations. In addition, they acquired general knowledge which helped to make the development process in the region integrative in nature.

Thus government officials became more adept at planning, whether national, regional or spatial.

Implementers of development began to gain a better understanding of how to coordinate effectively, raise productivity, raise per capita income, and achieve economic growth. Meanwhile, the influence of the oil boom started to be felt in the increases of central and regional
development budgets, which made possible the construction of large-scale projects such as highways, extension of electricity, expansion of harbours, and establishment of factories. As well, rural development was supported by central government policy in the form of *Inpres, Banpres*, and other projects.

The spread of large-scale projects throughout the province, accompanied by a development budget which was already in the billions of rupiah, made us look at the development process with different eyes. Rural development, which had been previously based on community cooperation (*gotong royong*), was beginning to be displaced by development by contract.

Development priorities began to shift towards increasing the output of commodities through raising productivity and efficiency. The orientation of the rural economy began to change from local consumption towards export.

Although such items as roads, bridges and irrigation had useful 'trickle-down' effects, it became evident that large industries (for example, the Padang cement factory and the Umbilin coalmine) did not have such big effects as previously estimated, especially in terms of employment.

With the existence of GBHN and planned development through a series of *Repelita*, and with the increased skills of the government apparatus in putting together regional development plans, the links between central development projects which are sectoral and projects which are regional could be given more attention.

From the point of view of the marketing direction and target of West Sumatran products besides coal and cement, some forest products such as wood, rattan and estate agriculture products were increasingly being exported.

This meant that all the technical intricacies connected with foreign trade had to be better handled by the relevant technical agencies of the government and the private sector. Apart from this, the community needed to be further trained in order to maintain and increase the quality of smallholders' produce. Here the institutions of higher education were expected to take a role, because the farmer producers of the agricultural sector needed increasingly sophisticated support and specific technical information. They also needed the support of extension workers from the technical agencies involved.
The role of tertiary educational institutions was in the form of studies, surveys, research, and information via KKN. They further had to provide inputs to Bappeda and the regional government, and to private economic organizations like Kadin. This was done by a number of routes, including organizing seminars.

**Background to the history of development in West Sumatra**

The population of West Sumatra by the end of the 1960s was approximately 2,800,000, and in 1989 was approximately 3,700,000. Of the total area of about 4,200,000 ha in West Sumatra, only 200,000 ha (or 5 per cent) can be used for food crops, because much of the province is traversed by a mountain range which is full of jungle, ravines and lakes.

Traditionally, the tree crop agricultural sector of West Sumatra has been oriented towards estate agriculture (tea, coffee, rubber, and cocoa). Cinnamon, coconut and other crops have largely been cultivated by smallholders.

It was only in the 1980s that a gradual rehabilitation of large state-owned plantations took place—for example, with tea and oil palm.

In the mid-1970s, West Sumatra began to process its forest timber, first to the sawmilling stage and then to produce plywood. The Umbilin coal mine gradually began to be rehabilitated, and its production now exceeds the production before World War II.

The Padang Cement Company (*PT Semen Padang*) began to be rehabilitated, and has now started to expand. There are also a number of food-processing operations, such as biscuits and drinks factories, which comprise medium and small industry.

Also in the mid-1970s, the tourist industry started to develop, using the attraction of the natural landscape of mountains, valleys, lakes, and long beaches for economic benefit.

A source of capital for the economic development of West Sumatra are the traditional skills and expertise of the Minangkabau people in trading and other services. As a result the small trading sector, entailing sidewalk vendors (*kaki lima*), small outdoor restaurants (*warungs*), and small shops are still largely in the hands of these local people, who represent the pride of the local community.

Although the picture just given of economic development is heartening, the sector primarily absorbing labour is still agriculture, and
especially wet and dry rice cultivation, even though this area is such a small proportion of the total area of West Sumatra. The income of most people is still dependent on agriculture.

Keeping in mind this picture of West Sumatran economic development, I will conclude by trying to analyse the policy steps taken by the regional government to effectively utilize potentials in natural resources and in the use of knowledge and technology.

Conclusion

This paper has deliberately been descriptive, because it is a case study from experience. It has stressed the preconditions for regional development, especially in the rural sector, rather than providing an analysis of more technical aspects of regional development, but it has pointed out how all the apparatus of regional government and central government agencies located in West Sumatra have already mastered such technical aspects after several Repelita.

The emphasis of the paper is on ways of creating the conditions or the climate for developing a region (or province), in a situation where the government physical infrastructures have not functioned as expected and required by the development process.

Increasing the expertise and skills of the implementers of development is an essential condition for speeding it up.

Involving the community in the development process through social leaders is very helpful to the regional government. Because of this, the psychological and cultural approach to the Minangkabau community, which still adheres strongly to local government, must be embraced so that they view development of their own homeland as that owned by and for the community, not just as a part of government control.

Cooperation between the three pivotal social groups (the ‘central pillars’ of Minangkabau society)—that is, the people themselves, the ulama ninik mamak (or traditional leaders), and the cerdik pandai group (the intellectuals, lecturers, university students, and teachers)—is very useful as a ‘motor of development’.

The three groups have each consciously been given a role, so that they do not become mere ‘observers’ or beneficiaries of development.
Priority should be given to those projects which are valued highly (not in monetary or cost terms) by them, and which directly relate to the community and the environment concerned.

The integration of the use of funds, the strengths brought by both the government and the local community, and the participation of ABRI in the villages, has proved very effective and has spawned a development approach known by the term *Manunggal Sakato* which means 'sharing the heavy and light burdens'.

The role of the foreign technical sections and their skill-sharing with the development implementing apparatus under the coordination of *Bappeda* has been very valuable.

The role of *Bappeda* as development coordinator, planning body, and 'think tank' for regional development (supported by personnel from local tertiary educational institutions) helped to improve the quality of the bureaucracy for its task. This role was aided by the establishment of simple operational branches at the offices of village heads in West Sumatra, under the supervision of the Level II *Bappeda*.

Accompanying the development successes and achievements in West Sumatra, there were also many obstacles and challenges, both from within as well as from outside the region. These obstacles included the problem of inadequate development funds, in a situation where the scope of the community's needs and wants was always shifting and expanding.

During this time the urbanization process has moved ahead quickly, whereas the rural areas have been left behind in many aspects. The battle cry 'young men go to the village' is still not effective. The reward system for those intellectuals and professionals who may be placed to help develop the villages is still far from being attractive, except to a few groups of idealists.

The decentralization and local effectiveness of the regional government need to be enhanced. Government and private institutions must provide the necessary information to rural producers concerning the marketing of their agricultural products, give them ways of obtaining credit which are not too intricate, and supply appropriate technologies at an affordable cost as well as making available the knowledge required to utilize them.

There are still many other matters which need to be addressed to bring rural regional development to its point of momentum. These cannot be analysed, however, in this short paper.

In summary, I think that whatever and however the process of rural regional development unfolds, it ultimately depends on the type of people who have a vision of the great enterprise we call development.
Introduction

The aim of this chapter is to examine the development process, particularly as it applies to the livestock subsector in NTT. I propose to describe the fundamental procedures of development, and my main theme is about the importance of planning. Development of a sector or subsector must be planned on a long-term basis if waste of effort and misallocation of resources are to be avoided. The development process is not just a number of unrelated projects that happen to be implemented during a particular five-year period.

In my opinion, development of a sector should comprise three major procedures:

1. the preparation of a long-term plan;
2. the phasing of this plan into specific five-year programmes; and
3. the conduct of particular projects that are systematically implemented to conform to the overall plan.

In many countries, there is no long-term plan—no soundly conceived strategy—for agricultural development, nor usually are there plans for any other sectors in the economy. In the past, many resources have been squandered on a host of projects and endeavours that were often unrelated and unsustainable. In this paper, I give some examples of these. After nearly 40 years of development work in the Third World, people are wondering if more could have been obtained from the resources used.

The processes of livestock development, indeed the steps in any development programme, arise from answers to two or three questions. The simplest of these are: why develop? and how to develop? Alternative questions may be: what is wanted? what is there to start with? how is it done?
Put in another way, development may be prompted by a desire to fulfil one or more needs of a community, or it may originate from the community's wish to make better use of a resource; this latter wish could include resource conservation. In reality, the two basic reasons for development merge into each other, and it becomes somewhat unnecessary to talk about 'needs-based' and 'resources-based' development. The important issue is to identify clearly the goals, major beneficiaries and target commodities of development before embarking on the next step in the process, which is formulating a development strategy.

A plan or strategy will involve certain techniques or procedures for applying technologies. These techniques are not the technologies themselves, but rather the way in which technologies are identified and applied. The training and visit (T&V) system of extension is a technique for introducing appropriate technologies to farmers and for obtaining feedback from them. Farming systems research and development provide a technique for creating technologies that are suitable for smallholders; promoting private sector development is a technique for invoking entrepreneurial skills and for tapping savings. Livestock distribution schemes, whereby animals are provided to people who previously had none, form a technique for obtaining social equity; and for accelerating the uptake of technology. This is a process that may otherwise only occur for livestock-related innovations every twenty to thirty years, i.e. with a generation change.

The choice of techniques is an integral part of the development process, but the most fundamental part is the plan. Unfortunately, livestock development is often attempted without prior preparation of a plan, and this often results in confusion and a waste of effort and opportunities.

This chapter includes a discussion of 'resources', in which I have included suggestions for making data more useful. There is also a section on 'needs', particularly those that may not be immediately apparent. The planning 'strategy' or process is then described in some detail, and I conclude with a review of the current situation and practical possibilities in NTT.

**Resources**

Data on livestock resources have little meaning until they are presented in a relative fashion. Of particular importance is the relationship—the
relativity—between livestock numbers and their feed base. The relationship of livestock numbers to the human population, and the distribution of livestock amongst the farming community, are also of significance. Too often livestock resource data are presented in isolation from other information which would make the data meaningful. This often arises because the other information is not being collected by people servicing the livestock industry; it is also due to a common failing of not understanding the significance of data and how it can be used.

If the number of animals in an area appears greater than that which the feed resource can sustain, it may be cheaper to improve their productivity than to improve the quantity of the feed resource. Such improvement could involve making the animals more efficient in their use of feed, so as to obtain the same amount of product from the same feed resource but by using fewer animals. In many parts of Turkey and Nepal where the feed resource is limited, improved livestock productivity has been attempted as well as improvement in the quality of the feed base. A simple way of improving animal productivity, and of increasing feed conversion efficiency, is to reduce the rate of livestock mortality. An animal that dies after consuming 2–3 tonnes of feed has obviously wasted that feed resource, unless it was being kept solely for the production of manure. A cow that could produce a calf every twelve months but in fact only has one every twenty-four months is likewise wasting a feed resource.

Of great concern to me, in respect of NTT, is the failure to estimate the feed resource base which supports the livestock population. For cattle, buffalo, goats and horses, the major feed in NTT is the product of grasslands, which is a mixture of herbs, legumes, grasses, herbaceous plants and trees. Arable agriculture, mainly the production of food crops, is making increased inroads into the grasslands of NTT, particularly in West Timor. In other areas, e.g. East Sumba, much of the grassland cannot be used by grazing animals because there is no water for them to consume; most animals like to obtain water at least once a day, although in parts of Africa they may only have access to water every two to three days, even in the dry season.

Accessibility has to be determined when estimating a feed resource base, as does quality. Grasslands vary greatly in quality during the course of a year. In NTT, there is a short period of high quality feed, maybe for a month after the onset of rains in November, followed by a
longer period of deteriorating quality over the next 4–5 months. During the six months from June to November, the quality may be so poor as to barely maintain life. In the latter part of this period, mature animals may lose 15 per cent or more of their initial liveweight.

Another major feed resource for livestock, particularly for ruminants such as cattle, buffalo and goats, are crop residues and agricultural by-products. Straw, maize stalks, bean vines and rice bran are examples in NTT. The weeds of crop agriculture and the growth on land left idle between crops also constitute a useful feed resource, which may be systematically used by livestock, particularly in the early part of the dry season. Later in the dry season, however, there is precious little to eat, and even if rice straw or maize stalks had been preserved, their feed value or quality would be low. Certainly, their inherent quality markedly affects the amount of effort and money that can be spent on their transport and conservation.

The main hope for this lean period from June to November is in leguminous tree crops, the best example of which is *Leucaena leucocephela*, known in Indonesia as *lamtoro*. Elegant systems of conservation farming have been developed in NTT using this crop, and they have had a marked effect on food crop production particularly in Flores. In the Amarasi area of Kupang district in West Timor, a simple but radical system of cattle production was also practised over several decades. During this period Bali bulls were fed on the leaves and twigs of *lamtoro* for 300–400 days, under a cut-and-carry system of husbandry that produced liveweight increases in the order of 100–150kg. Such animals subsequently fetched a premium in the live animal trade of slaughter cattle sent to Java.

In 1986, the growth of *lamtoro* throughout NTT was seriously affected by invasion of a psyllid insect. Subsequently this insect became established and has caused the death of much *lamtoro*, the overall production of which must have been reduced by about 75 per cent. Not only has this adversely effected crop and livestock production, but the risk of soil erosion has been increased as plants have withered and as alternative trees have been destroyed in an attempt to use them to replace *lamtoro* as stock feed.

Efforts are now being made to find psyllid-resistant varieties of *lamtoro*, and to use alternatives to this plant. Fortunately, there are several native tree legumes which are a valuable source of feed for ruminants and which are now being adapted for row-crop production in
conjunction with food crops. This system of land use, known as alley-cropping, is the twentieth century alternative to swidden agriculture, the traditional slash-and-burn system of conservation farming.

Another resource which I wish to consider in respect of NTT is labour. The availability of labour is crucial to certain systems of livestock production. Conventional dairy production is labour-intensive; it is being promoted in Java to use underemployed rural workers. It is also being promoted in Java and elsewhere in Southeast Asia for strategic reasons, so as to avoid issues such as dollar imperialism. In NTT, surplus labour is not a factor in favour of livestock production unless a form of production can be introduced that is seasonal in nature. Women, children and men appear to be overworked during the food crop production season from November to April or May. If there was greater food security, as in some other parts of Indonesia, the situation in regard to livestock production would change. A side effect of the green revolution in crop production has been expansion of the livestock subsector.

When preparing a profile of the demands on labour, intervals of seven to fourteen days may have to be used at certain times of the year to disclose bottlenecks created by crop agriculture. It should be remembered that draught animals introduced to take the drudgery out of crop agriculture will themselves create a labour demand of from two to three hours a day for management and feeding when they are kept intensively. It should also be recognized that in order to maintain a regular supply of replacements for 1,000 draught animals used on about 2,000ha of croplands requires a herd of around 2,500 animals of mixed ages. This number of animals would require 7,000-10,000ha of grazing in drier parts of the world such as NTT.

These figures provide an example of the interrelationship between crop and livestock agriculture. They also illustrate the need for planning when designing schemes for increased production. The figures are drawn from experience with a rural development project in Malawi, where initially we had a serious constraint of labour for crop agriculture; subsequently there developed a shortage of grassland on which to maintain the cattle herd needed to provide replacements for the draught animals introduced to resolve the labour problem. This was a complex but real situation that could have been avoided.

Before moving on to the next section of this chapter, I would like to refer to some figures on livestock on NTT. The figures in Table 9.1 of
absolute livestock numbers do not mean much on their own. In Table 9.2, however, there are two sets of ratios provided. The high number of large animals per farm family in West Timor should be noted, as should the very small amount of land in that part of NTT for each large animal. It should be mentioned here that while livestock population data may be presented annually, they are not always based on regular census; instead they may be derived by extrapolation from an earlier census, following which population changes are estimated by multiplying them with a predetermined factor representing growth. This can lead to anomalies.

The meaning of the word 'ownership' may vary greatly between locations and people. Most farm households have a few chickens, and many have two or three goats and a pig. There is a dearth of reliable data on which to formulate development plans, but more use could be made of existing data in regard to ratios and relativities, especially if these estimates were compared to field observations. However, since little use is made of data, little attempt is made to refine them.

The cattle, buffalo and horse populations of NTT have been used traditionally to provide meat to Java; more recently, breeding cows have been provided to Sumatra. The cattle population in particular is regarded as a valuable national resource, as well as an important regional one. Cattle are kept mainly as a source of cash from their sale into the meat trade. Other animals are also reared for sale or barter. Ownership of animals confers prestige; this is particularly so of cattle. In NTT, animals are seldom used for draught purposes, although limited areas of land may be initially cultivated by trampling. There are substantial populations of goats, pigs and poultry in NTT, but relatively few sheep. Sheep are not encouraged in West Timor because of their involvement in a disease to which Bali cattle are particularly susceptible. Goats, pigs and poultry are essentially village-owned animals, and are not kept in commercial units of production. The productivity of all livestock is low, the major constraint being a lack of feed.

**Needs**

If there is a need to save foreign exchange by providing meat to Java in order to satisfy the rising expectations of urban populations, then this gives a good indication of what to develop in NTT. If, however, a reason for development is to increase smallholder incomes, the appropriate part of the livestock subsector to develop is not so obvious. While most cattle-owning farmers possess only one or two head of cattle, most cattle
Table 9.1: Livestock resources NTT, 1987

<table>
<thead>
<tr>
<th>Location</th>
<th>Numbers of animals</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cattle</td>
<td>Buffalo</td>
<td>Goats</td>
<td>Chickens</td>
<td>(million)</td>
</tr>
<tr>
<td>West Timor</td>
<td>518,000</td>
<td>52,000</td>
<td>226,000</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Flores (+Alor)</td>
<td>35,000</td>
<td>47,000</td>
<td>141,000</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Sumba</td>
<td>44,000</td>
<td>75,000</td>
<td>24,000</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>597,000</strong></td>
<td><strong>174,000</strong></td>
<td><strong>391,000</strong></td>
<td><strong>4.1</strong></td>
<td></td>
</tr>
</tbody>
</table>

|                | Horses             | Sheep    | Pigs     | Ducks    |            |
| West Timor     | 66,000             | 71,500   | 454,000  | 52,000   |            |
| Flores (+Alor) | 56,000             | 13,000   | 396,000  | 53,000   |            |
| Sumba          | 59,000             | 1,500    | 146,000  | 8,000    |            |
| **Total**      | **181,000**        | **86,000** | **996,000** | **113,000** |            |


Table 9.2: Livestock distribution, NTT

a) Large animals per farm family

<table>
<thead>
<tr>
<th>Location</th>
<th>No. of farm families</th>
<th>No. of cattle, horses, buffalo</th>
<th>Ratio animals/family</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Timor</td>
<td>212,000</td>
<td>636,000</td>
<td>3.0</td>
</tr>
<tr>
<td>Flores + Alor</td>
<td>220,000</td>
<td>138,000</td>
<td>0.6</td>
</tr>
<tr>
<td>Sumba</td>
<td>66,000</td>
<td>178,000</td>
<td>2.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>498,000</strong></td>
<td><strong>952,000</strong></td>
<td><strong>1.9</strong></td>
</tr>
</tbody>
</table>

b) Hectares per large animal

<table>
<thead>
<tr>
<th>Location</th>
<th>Area (million ha.)</th>
<th>No. of cattle, buffalo, horses</th>
<th>Ratio ha/animal</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Timor</td>
<td>1.6</td>
<td>636,000</td>
<td>2.5</td>
</tr>
<tr>
<td>Flores + Alor</td>
<td>2.0</td>
<td>138,000</td>
<td>14.5</td>
</tr>
<tr>
<td>Sumba</td>
<td>1.1</td>
<td>178,000</td>
<td>6.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4.7</strong></td>
<td><strong>952,000</strong></td>
<td><strong>5.0</strong></td>
</tr>
</tbody>
</table>

are owned by only a handful of people. From the *hypothetical* data in Table 9.3 (which is nonetheless *perceived* to approximate the actual situation), it will be noted that 55 per cent of cattle and buffalo owners own only one or two head of these animals.

**Table 9.3: Ownership distribution: cattle and buffalo, NTT**

(hypothetical recent situation)

<table>
<thead>
<tr>
<th>Size of cattle and buffalo herd</th>
<th>No. of farmers with such herds</th>
<th>% of farmers owning cattle and buffalo</th>
<th>No. of cattle and buffalo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>40,000</td>
<td>55.0</td>
<td>60,000</td>
</tr>
<tr>
<td>3-10</td>
<td>20,000</td>
<td>27.0</td>
<td>120,000</td>
</tr>
<tr>
<td>11-25</td>
<td>10,000</td>
<td>13.5</td>
<td>180,000</td>
</tr>
<tr>
<td>26-100</td>
<td>3,000</td>
<td>4.0</td>
<td>180,000</td>
</tr>
<tr>
<td>101-500</td>
<td>300</td>
<td>0.4</td>
<td>120,000</td>
</tr>
<tr>
<td>500+</td>
<td>50</td>
<td>0.1</td>
<td>37,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>73,350</strong></td>
<td><strong>100.0</strong></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

But it will also be observed that almost 50 per cent of the cattle and buffalo are owned by less than 5 per cent of livestock holders. Since most farm households and village people own a few hens, however, it would seem wise to improve the production of these birds if the goal is to improve the welfare of villagers; this is provided, of course, that the birds do not compete with people for food.

Considerations of what particular livestock enterprise to develop have to embrace the means of development. If there are no cost-effective techniques and technologies available, then it will not be economically prudent to undertake development, although it may still be socially advisable. Take, for example, the village pig. Most rural households in NTT own a pig or two. As explained earlier, this is a scavenger on which little or no attention is lavished. It is economically efficient, but produces far below the potential of a commercial pig in an improved environment. To create this environment and to breed commercial varieties of pig are complex and capital-intensive processes. It may well be an appropriate activity for some entrepreneurs, who will probably not be farmers. In my opinion, improvement of village pig production should not have high priority at present in NTT, because there are easier ways
of developing the livestock subsector. Moreover, commercial pig production requires high quality feedstuffs, many ingredients of which can be directly eaten by people. Biologically, it is far more efficient for people to eat these materials themselves, rather than following their conversion into pig meat. Since many people in NTT are at a subsistence level, considerations of efficiency of production of food for people have to be undertaken.

Similar considerations also apply in regard to commercial poultry production. In addition, the biological advantages of concentrating production in a few large units have to be weighed against the social consequences of putting a large number of small operators out of business. I will give an example of this situation later.

Besides these rather obvious needs to supply meat to Java or money to village women, there are less obvious but possibly more profound biological needs for development. For example, consider a population of cattle from which the biggest and the best are always taken for slaughter. It is probable that the genetic foundation of the population will begin to crumble after 15–20 years if all that remain are the lame and stunted. In order to maintain a sustainable enterprise the integrity of the capital resource has to be safeguarded.

In the 1950s, the price of meat in mineral-rich countries of Central Africa rose dramatically. This encouraged cattle producers in neighbouring countries to allocate their feed resources to the production of steers for slaughter at a relatively young age, rather than marketing them several years later off unimproved grasslands. After about ten years of this activity, it was noted that the supply of steers was dropping. What had happened was a dramatic fall in reproductive rate as a result of neglect of the breeding females. The scarce feed resources had been denied to the cows in favour of a quick return from the males; the efficiency of the national herd as a whole was impaired.

Not only does the integrity of the animal resource have to be safeguarded, but so too must that of the feed resource. When rangelands are destroyed by overgrazing, other forms of mismanagement, or by usage for other types of agriculture, the situation cannot easily be reversed in a harsh climate. Unless alternative feed resources can be found that are appropriate financially, biologically and culturally, the livestock industry that was previously based on the rangelands will collapse. This situation must be anticipated in West Timor. The challenge is to slow down the loss of rangelands and to develop alternative
systems of livestock production that are economically feasible, socially acceptable and sustainable. Some of these alternatives will involve the development of new livestock production systems in Flores and Sumba to complement the changes that should be anticipated in West Timor. In the meantime, the efficiency of existing livestock systems needs to be improved by avoiding waste from disease and death, waste from impaired reproduction and waste from mismanaged feed resource use.

Strategy

Plans, programmes and projects

As mentioned earlier, a key element in the livestock development process is the plan. This may have to be conceived over a 20–30 year period for several aspects of livestock production; it will also need to be drawn up with knowledge of other means of land use and with an awareness of other developments elsewhere in the region and in the country as a whole. The plan should be designed to meet clearly defined goals by optimizing use of resources in a manner that is both culturally acceptable and technically appropriate. For example, the plan should embrace financially sustainable systems of production that are ecologically sound. The nature of the plan will be influenced by the techniques chosen for development. Long-term development plans in Laos or Tanzania would employ different techniques for applying technologies than those in Thailand or Kenya, although the ultimate objectives could be similar.

Eventually the plan will be divided into detailed programmes, which conventionally are for five-year periods in conformity with national schemes of development. A programme consists of projects that are specifically designed to meet immediate objectives, while conforming to the ultimate objectives of the long-term plan.

Unfortunately, the reverse process occurs in many countries. Projects that may have been designed outside the region or even outside the country are implemented in an opportunistic fashion, in the hope that they conform to some vague scheme for promoting progress. Frequently there is no well conceptualized and integrated plan of livestock development, and programmes are merely a statement of the wish to obtain certain increases in production without any detail on how this may be done. I describe this process as 'project-dominated development'. It is a haphazard process that may result in the dissipation of
scarce technical and managerial resources. The projects are often not sustainable because complementary developments have not taken place. Some of the worst examples of project-dominated development took place in eastern Africa in the 1960s, as countries gained independence and donor nations competed to provide aid. Nearer to home, one gains the impression that rural development in Nepal is controlled by a variety of aid agencies that vie with one another for technical resources. Each district or catchment area seems to have a different policy and approach to development, and there is little that is sustainable without continued inputs of foreign aid.

Project-dominated development is dangerous. It can waste resources and be disruptive; it may be counterproductive. Yet the alternative systematic approach based on the assembly of data, the design of long-term plans and the organization of educational, marketing and support services in order to utilize resources efficiently and rationally may contain the seeds of its own defeat, since these procedures take time to implement. Those undertaking the systematic approach may not feel the same urgency for speed as those outside the system who need help now. In these circumstances, progress may have to be initiated in the absence of a long-term plan by implementing projects that provide basic services such as those in communications, education and public health. Something at least gets started in this manner, and in some countries this may prove to be the hardest job of all to accomplish. But once things are moving, they should be swiftly embraced by an integrated and progressive scheme of development.

The responsibility for drawing up a livestock development plan does not only rest upon livestock technicians; it should embrace economists, sociologists and other specialists. However, the planning process can start with an accurate assessment by livestock technicians of data about the available livestock and feed resources, and an appraisal of how these may be improved. But soon these improvements have to be evaluated in the context of their contribution to national and regional goals, and they have to be assessed in the light of developments elsewhere in agriculture and other sectors.

All this is a demanding and crucial exercise; once completed it will influence profoundly the context of future programmes and the choice and timing of future projects. In the case of NTT, it is essentially a provincial exercise, although it must recognize the needs of districts and subdistricts. The planning process may have to reconcile the apparently
conflicting requirements of the nation as a whole and of village people. This may be a particular challenge during the fifth and sixth national development programmes, as Indonesia moves away from centrally directed development implemented via public sector schemes to more regional autonomy and the involvement of private sector skills and capital. This broadening of goals and objectives is likely to focus attention on the techniques of development—the procedures used to choose and apply technologies and to harness managerial skills and capital.

Techniques

Livestock distribution. The political persuasion of a country will influence the techniques employed for development and the type of plan which is created. In Indonesia, the doctrine of Pancasila and the emphasis in successive five-year development programmes on promoting equitable development both regionally and socially suggest that attention should be directed to using livestock distribution schemes as one technique of development. As mentioned earlier, such schemes are designed to provide animals to households not currently possessing them. The animals may be drawn from areas where there are excessive numbers, or from extensive systems of low productivity. The aim is to increase livestock productivity as well to obtain social equity. When such schemes are operated in conjunction with the banking system, an awareness of institutional credit develops, and the move from a subsistence non-monetary society to a more commercial one commences. The rapid uptake of new means of production and the development of new organizational structures are noteworthy ancillary benefits derived from such schemes.

Private sector. Techniques aimed at involving the private sector in development will be needed during Repelita V, since it is a stated aim of this five-year programme to encourage the private sector to take the lead. The government is aware that it simply cannot continue its role as the fountainhead of all economic activity. In my opinion, increased involvement of the private sector in development will provide a substantial challenge.

There will be elements in the public sector that do not wish to abrogate their authority to the private sector; and much of public sector is not equipped or trained to service commercial enterprises. Govern-
ment policies and the objectives of many aid donors are aimed at the lowest income groups in society, where subsistence activities prevail over commercial ones. When commercial activities emerge, as in livestock trading, they are often deemed as extortionate.

It is a feature of many developing countries that the private sector comprises a few very large operators, often enjoying some government patronage, and a large population of people on the borderline of poverty who struggle to subsist. There is only a small middle class in these circumstances, most of whom are, or have been, associated with the public service; such people are rarely innovative.

When I first became involved in development banking in the early 1970s, it was with a small institution in the Caribbean that was prepared to lend to both private and public sectors. Our greatest challenge with regard to private sector investment was to find entrepreneurs—people with the skills to initiate innovations and subsequently to manage them. I believe Indonesia is going to experience the same challenge for the next decade or so.

The shortage of entrepreneurs with commercial skills is going to be especially apparent in the agricultural sector, particularly in NTT. Moreover, there is the risk that when such people do undertake some form of primary production this could be inimical to village-based activities. I am reminded here of a poultry enterprise in the Caribbean that was designed to produce several thousand eggs a day. This was a modest enterprise in modern terms, and one that was estimated to be financially attractive because of economies of scale and the opportunities to backload poultry feed from the USA in cargo boats that had collected bananas. However, the commercial poultry enterprise would have put several hundred village operators out of business, and the Caribbean Development Bank declined to finance it.

Entrepreneurs develop from certain social circumstances and education systems; in Indonesia some sections of society are regarded as more commercially oriented than others; I am told that the Bugis of Sulawesi show particular skills of this nature. An increasing number of well-trained people with managerial skills will be leaving the public service in the coming decade, and it might be worthwhile taking steps to employ some of them in commercial activities; they are a valuable resource. Non-government organizations (NGOs) could be encouraged to help the community to develop entrepreneurial and managerial skills, and cooperative developments could be supported to promote commer-
cial activities. But I am not sanguine about Indonesia's ability to develop middle-level commercial activities in agriculture, especially in NTT. Social agriculture as compared to commercial agriculture may have to prevail in much of this province.

*Appropriate technology*

It is now widely recognized that any technology used in projects must be ‘appropriate’ before the latter can be expected to succeed, but there may be different ideas about the meaning of this term. Technology should certainly be culturally or socially appropriate. In Australia, there are ways of improving rangelands which cannot be applied in NTT because the land is communally used and consensus about new means of land use will be hard to obtain. In Kenya during the early 1950s, we had great success with low-cost means of rangeland improvement because we could control the number and location of grazing animals; this was during the Mau Mau insurrection when the government adopted emergency powers for maintaining law and order. When these powers lapsed, the schemes collapsed and the deserts returned. The schemes were not socially acceptable, and thereby not sustainable.

An example of an inappropriate technique relates to the provision of animal health services in Bangladesh. In that country the person dealing with village livestock is a paramedic—a barefoot vet. His approach is empirical and simple. Diseases are treated and many cures result, but the general incidence of disease does not decline. Some years ago a project was implemented to improve the overall animal health situation, and was modelled on a pattern commonly found in better-developed countries. In the developed world, the field clinician is a highly trained veterinarian whose aim is to prevent disease as well as to cure it. He requires back-up services to refine his diagnosis, and surveillance services to formulate cost-effective control strategies. Such services require the use of elaborate equipment and expensive buildings that mystify the barefoot vet, particularly because he himself does not perceive the need for them; all he wants are more antibiotics and more broad-spectrum worm remedies. An elaborate infrastructure was established in Bangladesh, but it was never really used because it was inappropriate to the needs of the people operating the system. A lot of money was wasted.

Technologies must provide some obvious benefits to those who will be expected to adopt them. When wealth is measured by the number of
animals rather than their condition, a technology that results in fatter animals will not be attractive. Animal health technologies are usually readily adopted, since the death of an animal may result in its owner losing his livelihood or the equivalent of many years of savings. Where there is a monetary economy, financial benefits from the adoption of a new technology are required, but the risks of adopting it should not be great and the rewards should be substantial. The new technology should also complement other systems of land use, and should not be unduly disruptive of management's time.

Technologies and the projects that embrace them must be financially sustainable as well as socially acceptable. The costs of operating animal disease surveillance services are high. When such costs are subsidized by an aid agency, they may function satisfactorily, but they will fall into disuse when external support is withdrawn unless costs have always been kept to a minimum and unless some cost recovery procedures have been introduced early. Even in the most primitive areas of West Timor, there is some cost recovery for the provision of animal health services, although the recovery process is not yet institutionalized. In NTB, cost recovery schemes are being developed by groups of new cattle owners without any advice or assistance from the district livestock services. We should not underestimate the willingness of farmers to pay for at least part of the services that are of obvious benefit to them. In another context, we should also be prepared to pay a farmer when he provides land and labour to help in the research and development of new technologies, including the time he spends providing information for farm surveys and rural appraisal procedures.

The easy part of a technology to make appropriate is that concerned with biology. The real challenge is to devise technologies that are socially acceptable and sustainable.

**Practice**

**Planning**

There is no long-term livestock development plan for NTT. Development tends to be project-based and haphazard. Central government regards NTT as a source of cattle for consumption in Java, but little has been done in a consolidated way to safeguard this resource, let alone improve its productivity. Likewise, little has been done to safeguard the feed supply. Put in a somewhat emotive way—the people of Java are
eating the livestock resource, and the people of West Timor are destroying the feed resource.

At the provincial level, there is greater awareness of the relative importance of cattle production and other agricultural enterprises in NTT. The role of animals other than cattle for improving farm incomes is also more widely recognized. Indeed, a possible conflict between national demands for meat and the provincial demands for an equitable spread of income may be one of the causes for there being no long-term plan for increasing the production of any livestock commodity; the subject is in the ‘too hard basket’.

In August 1988, I had far-reaching discussions in NTT about the need for a long-term livestock development plan to embrace cattle production, rangeland improvement, feed resource use, poultry production and other related aspects. There was full recognition of the need for this; but the task of preparing such a plan is daunting, and it is unlikely to be attempted without external assistance.

It is in this area of planning activity that Australia, or some other aid donor, could make a great contribution to development with relatively small inputs. However, it is not a glamorous area of activity and the task itself is exacting. In developing countries there are few people with the lateral skills to do the job, and those with the necessary depth of experience are usually fully employed in senior managerial positions. The job requires much discussion, negotiation and compromise, which does not suit a quick assessment approach. Nonetheless, the creation and adoption of a long-term development plan, its subsequent phasing into development programmes, and the identification of projects to systematically fulfil the overall plan, is a powerful tool for influencing public and private sector activities.

Suggestions for NTT

Cattle industry. I would afford cattle production priority attention. The cattle of NTT are a valuable national and regional resource which are virtually irreplaceable. In West Timor and Flores, I would base cattle production on the Bali breed. I would not countenance any cross-breeding. A plan of breed improvement is required which could start with the establishment of a small regional stud at Besi Pae. Selection of males should be based on their ability to gain weight rapidly—on their feed conversion efficiency—and females should be selected on their
breeding frequency and the liveweight of their offspring at weaning. Weaning weight is a measure of the mother’s ability to produce milk.

**Cattle management.** In recognition that feeding and management are just as important for good performance as breeding, I would support schemes whereby cattle are distributed from the larger extensively managed herds to more intensively supervised situations. The tender loving care of the one man–one cow operation has inestimable value.

**Range management.** I would pay particular attention to range management and to the distribution of water. The indiscriminate provision and use of stock water may cause deserts to spread. I would recognize that it could be several years before any coordinated plan of rangeland improvement was adopted in West Timor.

**Stratification.** I would try to move cattle out of West Timor to less densely populated parts of Flores, East Timor and even East Sumba by means of cattle distribution schemes. In the long term, the aim would be to establish cow-calf operations on extensive areas of grazing in these locations, and to move the surplus males for fattening to areas where there are adequate supplies of crop residues, by-products and leguminous tree crops. This would be the first step in establishing a stratified system of production.

**Disease control.** I would support means of avoiding waste from animal disease and death. The animal diseases currently in NTT are not as great a challenge to the livestock industry as are the vagaries of feed quality and quantity, but it is relatively easy and cost-effective to do something about them. I would pay particular attention to calf mortality, and to the reproductive efficiency of breeding females.

**Fodder conservation.** At this juncture, I do not advocate any form of fodder conservation, despite the severe deficit of feed that exists from August to November each year. I know of no cost-effective and appropriate means of providing quality feed during this period by fodder conservation. Instead, I would search for some means of using high quality leguminous tree crops to enhance the nutritive value of low-quality roughage.

**Artificial breeding.** The relatively ‘high-tech’ procedures involved in artificial breeding are not unduly complex to apply to one or two animals. The operation of artificial breeding processes on a district basis is,
however, very demanding of managerial skills and logistical support. Few economically viable schemes are operating in the developing world, and while a case can be made for subsidized schemes, this could not yet be done in NTT at the village level. At present, I believe that artificial breeding techniques only have a place in eastern Indonesia as a research tool.

**Poultry production.** I would promote village egg production. There is now a heat stable oral vaccine to control Newcastle Disease. This vaccine was developed in Australia and subsequently tested in Malaysia and Thailand; it is easy to manufacture, transport and provide to birds in villages. A local variety of this vaccine has been manufactured in Bogor, but preliminary trials in NTT have not been encouraging. Nonetheless, I would continue to try to develop a vaccine that can be readily applied. In the meantime, there are some simple management innovations that could result in more eggs being hatched and more birds surviving to maturity. Modest breed improvement schemes to lift egg production from a surplus of 10–20 eggs a year to around 75 or 80 are feasible, provided they are well supervised and managed.

**Goat production.** Goats are widely dispersed, and most are owned by the poorer rural households. They warrant attention, but it is often not easy to evolve appropriate technologies that will result in improved systems of production. Prior to embarking upon any extension programme aimed at increasing productivity, a survey should be undertaken to disclose the major systems of production, the constraints experienced and the opportunities available. Such a survey will probably reveal some simple techniques that can be introduced immediately to improve productivity. Later, new extension packages can be evolved incorporating the results of local research and the findings from elsewhere. The improvements in disease control and in forage production prescribed earlier would also benefit goat production.

**Pig production.** I do not advocate any investment of effort to improve village pig production at present. In its pristine state, the village pig is biologically inefficient, but it receives few, if any, inputs which could be used by other livestock. It is essentially a scavenger, and as such is quite economically efficient. It may, however, constitute a public health hazard. It is inevitable that ‘commercial’ pig production will be developed one day, possibly in proximity to some of the larger towns. The
units will probably be based on the use of industrial by-products and household wastes, and it is unlikely they will be operated by the farming community. The various systems used will be typical of those throughout much of the world, and I see little need to undertake any research in NTT on improving these forms of production. If information is needed, it can be found elsewhere.

**FSR & D.** Farming systems research and development involves a series of processes that aim to assist research workers to produce results that are of value to smallholders. At the outset, existing systems of production are studied in order to identify major constraints and reveal opportunities. In many parts of the world, farming systems studies reveal that there is little or no incentive for farmers to change their ways. A common cause for this is price control, which no amount of biological research will alter. Farming systems studies should not be restricted to reveal only issues that may be tackled by agricultural researchers. At the other end of the FSR & D spectrum is the creation of an acceptable package of technology that the farmer wants to adopt, its presentation to the farmer by means of extension techniques, and attention to the logistics of supplying inputs and market outlets. This end of the spectrum usually embraces a number of organizations, and breakdowns often occur because of their inadequate coordination. In between these two ends there is research that may be intellectually demanding, but this in itself is insufficient. In many countries a disproportionate amount of effort may be invested in the research phase, with insufficient attention being paid to problem identification, technology transfer and logistical support.

In the past three years much attention in NTT has been given to FSR & D, particularly under the Nusa Tenggara Agricultural Support Project (NTASP); this project also covers Nusa Tenggara Barat. Support is also being provided through the National Agricultural Extension Project (NAEP III) to expand the extension services. The needs to obtain close integration of these endeavours and to link them in with the activities of the regional planning agency (*Bappeda*) are also being tackled, as is improved coordination of complementary agricultural activities under the auspices of the *Kanwil Pertanian*.

Since FSR & D focuses attention on appropriateness of techniques, it encourages an examination of this aspect as well as technologies. It is necessary to avoid the slavish application of models adopted elsewhere,
in either Indonesia or other parts of the world, that are markedly
dissimilar to NTT; this may be happening under NAEP III in extension
servicing and the provision of an animal health infrastructure. Not only
does NTT need to evolve its own models, but particular approaches may
be required for specific districts because of the wide social and
agricultural differences between various parts of the province. I
recommend continued support of FSR & D and the coordinating
activities of the Kanwil Pertanian.

Priority. The first thing I would like to see done in NTT is the
establishment of a planning facility for livestock development and
range management. An Indonesian colleague and I suggested in
August 1988, that a steering committee should be established by the
governor to advise on the formulation of a provincial strategy for the
long-term development of the livestock industry. We envisaged the
committee to be composed of members of Dinas Peternakan Propinsi,
the University of Nusa Cendana, Sub-Balai Penelitian Ternak, Kanwil
Pertanian, Bappeda and representatives of the private sector. Further­
more, we suggested that the committee would need some outside tech­
nical assistance; that it should be supported by two working parties—
one concerned with animal production, range management and forage
utilization, and the other with animal disease control; and that the
activities of both working parties should be strengthened with outside
technical assistance.

It is hoped that the ideas canvassed in this chapter will encourage
the establishment of long-term livestock development planning in NTT.
Introduction

Cattle were introduced into Timor in 1912 (Fox 1977). It is probably only since then that there has been significant pressure on fodder supplies in NTT. Cattle numbers were reported to total 414,000 in 1980, with an average density of 8/km², although densities were up to 23/km² in parts of West Timor. A range of other livestock including buffalo, goats, pigs, sheep, deer and poultry are also raised by village farmers.

Apart from sophisticated systems based on cut-and-carry *Leucaena* fed to tethered/housed cattle, goats and pigs in Amarasi and Sikka (Piggin and Parera 1985), livestock are largely raised in uncontrolled, open-range, communal grazing systems on natural pastures. These pastures are composed mainly of annual and perennial grasses such as spear grass (*Heteropogon contortus*), kangaroo grass (*Themeda* sp.), *Sorghum* sp., *Bothriochloa* sp. and *Chloris* sp.

Active growth of these natural pastures commences during the short December–April wet season, and dries off around July–August. The pastures are often heavily overgrazed, especially near villages and watering points, and overgrazing is exacerbated by frequent fires during the dry season.

As the dry season progresses, pasture availability and quality become increasing constraints to livestock production. There is a need to increase forage production and quality in most areas.

There had been little attempt before the 1980s to improve forage supply for livestock, except for the efforts mentioned above with *Leucaena*-based cut-and-carry systems.
Justification for forage improvement

Tropical forage species have been cultivated for only 50 years, and much remains to be determined about tropical pasture improvement. Nevertheless, experience over the last ten years in Northern Australia has shown that animal productivity (Clark 1980; Ralph 1982; and Winter, McCosker et al 1985) and profitability (Wicksteed 1978) are increased by the introduction of legumes into native pastures. Native pastures in a range of areas have been shown to support around 0.25 cattle/ha and annual liveight gains of 25 kg/ha, and the introduction of legumes commonly gives a four-fold increase in carrying capacity to 1.0 beast/ha and a five-fold increase in gains to 125 kg/ha (Table 10.1 and Figure 10.1). Similar increases have not been measured in NIT, but are no doubt possible because of climatic similarities with semi-arid northern Australia.

Table 10.1: Effects of improved pastures on liveweight gain

<table>
<thead>
<tr>
<th>Locality</th>
<th>Unimproved pasture</th>
<th>Improved pasture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stocking rate (beasts/ha)</td>
<td>Annual gain (kg/ha)</td>
</tr>
<tr>
<td>Katherine</td>
<td>0.4</td>
<td>12</td>
</tr>
<tr>
<td>Lansdowne</td>
<td>0.25</td>
<td>23</td>
</tr>
<tr>
<td>Swanns Lg</td>
<td>0.25</td>
<td>27</td>
</tr>
<tr>
<td>Rodds Bay</td>
<td>0.28</td>
<td>24</td>
</tr>
<tr>
<td>Narayan</td>
<td>0.27</td>
<td>33</td>
</tr>
<tr>
<td>Kogan</td>
<td>0.25</td>
<td>42</td>
</tr>
</tbody>
</table>

Source: Ralph 1982.

Cattle are the only significant agricultural export from NIT. Numbers exported, mainly to Java markets, increased from 20,000 to 60,000 between 1978 and 1986 (Table 10.2). The dependence of this trade on forage supplies was illustrated when exports fell drastically to 50,000 head in 1987, the year after the devastating Leucaena psyllid arrived in NTT and halved Leucaena production (Piggin et al 1987).
Figure 10.1: Effects of improved pastures on livestock weight gains, Northern Australia, 1970-79

* from Clark 1980
Table 10.2: Production of cattle in NTT, 1978 to 1987 ('000)

<table>
<thead>
<tr>
<th>Year</th>
<th>Local slaughter</th>
<th>Inter-island for slaughter</th>
<th>Inter-island for breeding</th>
<th>Total offtake</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>28.2</td>
<td>21.3</td>
<td>4.1</td>
<td>53.6</td>
</tr>
<tr>
<td>1979</td>
<td>15.2</td>
<td>30.1</td>
<td>4.2</td>
<td>49.5</td>
</tr>
<tr>
<td>1980</td>
<td>15.7</td>
<td>30.8</td>
<td>4.1</td>
<td>50.6</td>
</tr>
<tr>
<td>1981</td>
<td>14.1</td>
<td>28.8</td>
<td>3.1</td>
<td>45.9</td>
</tr>
<tr>
<td>1982</td>
<td>14.3</td>
<td>38.6</td>
<td>5.8</td>
<td>58.7</td>
</tr>
<tr>
<td>1983</td>
<td>14.9</td>
<td>41.5</td>
<td>6.3</td>
<td>62.7</td>
</tr>
<tr>
<td>1984</td>
<td>17.7</td>
<td>59.8</td>
<td>7.9</td>
<td>85.4</td>
</tr>
<tr>
<td>1985</td>
<td>17.4</td>
<td>55.8</td>
<td>6.8</td>
<td>80.1</td>
</tr>
<tr>
<td>1986</td>
<td>17.8</td>
<td>59.2</td>
<td>10.7</td>
<td>87.8</td>
</tr>
<tr>
<td>1987</td>
<td>17.3</td>
<td>49.9</td>
<td>10.2</td>
<td>77.4</td>
</tr>
</tbody>
</table>

Source: Dinas Peternakan 1989.

Forage improvement is essential in NTT because:

1. Cattle, significant in Timorese life, are the only major export from NTT, and production is dependent on forage supply.

2. Large cattle production increases are possible with pasture improvement and improved animal management. Other livestock (buffalo, goats, sheep, pigs and poultry) would also benefit from improved quantity and quality of forage.

3. Land degradation is a serious problem in NTT, and is exacerbated by poor vegetative cover resulting from overgrazing and burning of native pastures and slash-and-burn agriculture. Timor was reportedly covered with dense monsoon rainforest as late as 1829 when the naturalist, Salomon Muller, visited the island. The shift to slash-and-burn corn culture after the introduction of maize around the 1670s (Fox 1977) had led to the development of extensive grass savannas by the 1930s (Metzner 1980).

4. Crop production can be increased and stabilized, and weed problems minimized, with the use of forage legumes in crop rotations. Corn yields in NTT have been doubled with the inclusion of a year of Leucaena or siratro/stylo (Macroptilium atropurpureum/ Stylosanthes hamata) in the rotation (Field 1985). Crop and rotation species residues can be used for stock fodder.
5. Wood supply, essential for cooking, fencing and building, can be improved by increased plantings of multi-purpose shrub legumes.

Forage development technology for NTT

Organized scientific agrarian advice under central Dutch direction began in NTT in 1930. Since then there has been impressive development of *Leucaena*-based farming systems in Amarasi and Sikka (Piggin and Parera 1984), although these have been grounded on 'best-bet' technology and have suffered recently with the arrival of the devastating psyllid, *Heteropsylla cubana*.

Objective forage research and development began in NTT only recently, with the commencement of the Indonesia–Australia Livestock Development Project in 1982. Since then, some 40 research trials on species/varieties adaptation, inoculation, fertilizers, establishment methods, time of planting and production have produced a viable technology for forage development (Piggin 1985; Piggin *et al* 1987; Piggin and Mella 1987). This technology has been tested and verified with villagers in the field, through extensive grassland and garden improvement (Piggin 1987) and through revegetation of dam banks, spillways and catchments (Piggin 1988). Appropriate technology is summarized below.

Species and varieties

Some 150 grass and legume accessions have been evaluated under a range of climatic and soil conditions in NTT. Performance was reasonably consistent across these conditions, and the following grasses and legumes could be expected to establish and produce well, stay green into the mid/late dry season, and produce large amounts of seed:

<table>
<thead>
<tr>
<th>LEGUMES</th>
<th>GRASSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caribbean stylo*</td>
<td>Buffel grass*</td>
</tr>
<tr>
<td>Shrubby stylo*</td>
<td>Signal grass*</td>
</tr>
<tr>
<td><em>Centrosema pascuorum</em></td>
<td>Sabi grass*</td>
</tr>
<tr>
<td>Siratro</td>
<td>Gamba grass*</td>
</tr>
<tr>
<td><em>Clitoria ternatea</em></td>
<td><em>Bothriochloa pertusa</em></td>
</tr>
<tr>
<td><em>Leucaena leucocephala</em></td>
<td>Rhodes grass</td>
</tr>
<tr>
<td><em>Leucaena diversifolia</em></td>
<td>Green panic</td>
</tr>
<tr>
<td><em>Leucaena pallida</em></td>
<td></td>
</tr>
<tr>
<td><em>Leucaena collinsii</em></td>
<td></td>
</tr>
</tbody>
</table>
Inoculation with rhizobium and scarification of legumes

Inoculation of pasture legumes (Siratro, Verano and Centro) with *rhizobium* bacteria has proved unnecessary on Viqueque soil; it is likely that effective strains are present in NTT soils. This is fortunate, because distribution and cool storage of commercial inoculum would be difficult in rural NTT.

*Leucaena*, however, survived and grew better on Viqueque and Bobonaro soils *with* inoculation; this was most easily achieved by mixing the seed with a little soil from an established *Leucaena* area before sowing.

Seed scarification sometimes improved establishment in the first year for Caribbean stylo, but effects varied with sowing time for *Leucaena*. The difficulties in arranging scarification and its small effect suggest that it is not worthwhile; desired populations may be best achieved by sowing rate and management.

Establishment methods

*a) Pasture grasses.* Pasture grasses have proved difficult to establish. Best results have been obtained from broadcasting and raking on a cultivated seedbed, or into a prepared furrow. Broadcasting onto uncultivated ground has been unsuccessful.

*b) Pasture legumes.* Pasture legumes have been relatively easy to establish. Broadcasting onto uncultivated areas has been quick and effective, and can be recommended in most situations. Cultivation and phosphorus fertilizer often improved initial establishment, especially
for Siratro and Seca Shrubby stylo, but broadcast sowings without phosphorus usually catch up in the second year.

c) Shrub legumes. *Leucaena* and *Sesbania* establish well from furrow sowings, or from ‘dibble stick’ holes where erosion may be a problem in steep slopes. Establishment was best from 2–5cm, and greatly reduced when nearer the surface or deeper than 5–10cm.

Poly-bag and bare-stem seedlings established and grew very well, but required considerable labour and materials and hand-watering before the wet season.

**Sowing rates**

Sowing rates of 1–6kg seed/ha for grasses, and of 2–8kg/ha for herbage legumes, were found to give satisfactory establishment.

For shrub legumes, the appropriate sowing rate depended upon the conditions where the planting was to be made. Where grazing was heavy, *Leucaena* was unable to establish regardless of sowing rate, weeding or fertilizer application. Shrub legumes should only be contemplated where defoliation can be controlled, at least in the first year.

In fenced and weeded areas (gardens), sowing rates for *Leucaena* of 25–50kg/ha on Viqueque and Lakustrine soils, and of 10kg/ha on Bobonaro, were required to establish rows 1m apart with plants every 10cm. For *Sesbania*, corresponding rates were 25–40kg/ha on all soils.

A lack of weeding reduced established plant numbers of *Leucaena* by about 30 per cent.

*Leucaena* and *Sesbania* are probably best established in gardens and ladang where crops are normally weeded and fenced. The failure of many shrub planting efforts in NTT can be attributed to the neglect of follow-up weeding and livestock exclusion in the first 3–6 months after planting.

**Time of sowing**

Pasture and shrub legumes (Siratro, stylo, *Leucaena*) can be sown in Timor at least four months before the onset of the wet season without adverse effects on establishment. Indeed, establishment and growth are often enhanced with early sowing. This means sowing need not wait for the break of the season, and allows large areas to be sown when time permits during the mid-late dry season. This is possible because there is
little predation of seed by ants, and little rain to cause ‘false break’ germinations.

**Fertilizers**

*a) Herbage species.* Establishing pastures on a range of soils in NTT (Viqueque, Bobonaro, Marine Sediment, Lakustrine, Alluvial Terrace) gave some responses to phosphorus in the first year, mainly through response by the legumes Siratro and stylo. Good pastures, however, could be established without fertilizers.

Use of fertilizers on pastures cannot be recommended on present information. The pastures give little response, and village farmers who live in a subsistence economy can rarely afford to use fertilizers on crops, let alone on grazing land.

*b) Shrub/tree legumes.* Added phosphorus had little effect on the emergence and survival of *Leucaena*, but consistently increased seedling survival for *Sesbania*.

Production of wood and leaf from seedlings and established plants was usually increased by 15–30 per cent with the annual application of 40kg/ha phosphorus, and the response was sometimes higher for *Sesbania* than *Leucaena*. Whilst it is unlikely that village farmers would purchase fertilizers for shrub legumes, it is suggested that plantings and good management (weeding, fencing) should be concentrated in higher fertility areas to maximize returns.

Better survival and production in *Sesbania* with added phosphorus suggests that the species is best adapted to high fertility situations. Certainly it is most common in house-garden areas, where soils are relatively fertile in Timor. In contrast, *Leucaena* is less demanding in its phosphorus requirement, and this explains its wide use throughout slash-and-burn cropping areas and rehabilitation areas. This suggests that *Sesbania* cannot replace *Leucaena* adequately in all situations, and a *Leucaena* resistant or tolerant to psyllid is a priority need for the less fertile areas of Timor.

**Tree/shrub legume productivity**

Studies over four years before the psyllid entered Timor showed that the maximum production which could be expected from well-established *Leucaena* was around 6,000kg/ha of leaf and 6,000kg/ha of stem (wood), with 1.5m row and 10cm plant spacings and 3–4 monthly cuttings. This is at the bottom of the production range of 6–18t/ha of...
edible dry matter (DM) quoted by Horne et al. (1986), no doubt because of the severe moisture limitations in the mid-late dry season; leaf production rates fell from 25–30kg/ha/day to 1–2kg/ha/day in the mid-late dry season.

Assuming that cattle need 10kg DM/day, it would be possible to feed 1.6 cattle/ha/year from a good Leucaena stand. This agrees with the frequently mentioned carrying capacity of 1–2 cattle/ha in the Amarasi district (Piggin and Parera 1984).

Since the 1986 arrival of Heteropsylla cubana in NTT, preliminary studies suggest that the productivity of Leucaena has been reduced to 50–75 per cent. This is a disaster for NTT, and the efforts which were commenced in 1986 to provide alternatives to Leucaena leucocephala need to be pursued vigorously. Initial tests have shown that L. diversifolia, L. collinsii, L. pallida and several hybrids are well adapted and maintain resistance. Seed of these is being propagated and distributed by the Dinas Peternakan. Efforts also need to continue to promote other shrub/tree legumes such as Sesbania grandiflora, Acacia villosa, Gliricidia sepium and Calliandra callothrysus.

Chemical composition of NTT forages

a) Shrub/tree legumes. Measurements of Leucaena and Sesbania grown in Viqueque soil at Besi Pae in central West Timor suggest that the low content of phosphorus and copper in both species, and of sodium in Leucaena, may limit animal production. It is possible that tethered animals may benefit from supplements. That farmers already recognize sodium deficiency in Leucaena forage is evidenced by the common practice in Amarasi of adding salt to drinking water for tethered animals.

b) Pasture species. Studies showed that there are possible deficiencies of sulphur, phosphorus, sodium and copper in improved legumes (stylo, Siratro) and in native grasses (Themeda Heteropogon) in Timor. Winter, McCosker et al. (1985) have similarly reported that animals grazing on pastures in northern Australia commonly need nitrogen, phosphorus, sulphur and sodium supplementation.

The usefulness of supplements for tethered and free-range livestock should be tested.

Crop and pasture/forage legume rotations

Caribbean stylo can easily be established below corn crops. It produces well in the first year without reducing corn yield, and re-establishes in
the second year from seed produced. It is not a vigorous crop weed, and can be easily removed in normal hand-weeding operations.

Planting of *Leucaena, Sesbania* and Caribbean stylo should be promoted in *ladang* and house-gardens (*kintal*), because these species establish best in cultivated, weeded, ungrazed situations. They can provide useful stock fodder and soil nitrogen improvement in these situations.

*Extension of forage development technology*

The main agricultural interests of Timorese villagers are crops and livestock. As subsistence farmers in a semi-arid environment with a long dry season, they literally survive or starve on the success of their cropping efforts. Livestock are for special occasions or times of need and, especially with cattle, are a form of wealth.

Farmers have little understanding that pastures are a resource that can be manipulated, managed and improved. They understand grasslands to be open, natural areas where livestock are released to fend for themselves, experiencing abundance in the mid-wet season to early dry season and increasing deprivation in the mid-late dry season. Grasslands are thus a much-abused resource and typically overgrazed in Timor. They are community-owned, and no individual has interest in expending funds or effort on them. This means that grassland improvement will be a very slow process, instigated and led by Department of Agriculture efforts.

There is some understanding of the use and value of tree and shrub forage resources. *Leucaena* and *Sesbania* are widely used (Metzner 1976; Fox 1977; Piggin and Parera 1984), and farmers are keen to receive and plant seed. Other useful shrub legumes such as *Gliricidia sepium, Calliandra callothrysus* and *Acacia villosa* are less well known. Poor seed supply, ignorance of proper planting and management techniques and, recently, the arrival of the devastating *Heteropsylla cubana*, are all constraints to widespread and successful establishment of shrub/tree legumes.

Villagers do not generally appreciate that herbaceous grasses and legumes can be used in backyard forage banks and rotations to feed livestock, increase fertility, and reduce weeds in subsequent crops.

In this situation, improved pasture and forage technology must be introduced patiently and with understanding into villages. Whilst farmers are patently enthusiastic about improved crops, most lack the
experience to be similarly enthusiastic about pasture and forage improvement.

With this background and the improved technology described above, a range of extension techniques has been used in project villages to introduce improved pastures and forages. This has been described and assessed by McIvor (1986), Kerridge (1986), Piggin (1987) and Bray (1987). It has included species demonstrations, seed production gardens, backyard forage areas, crop and pasture/forage rotation demonstrations, grassland and roadside oversowing, forage conservation demonstrations, field days and farmer training, and farm visits and farmer meetings.

The techniques have been successful in introducing technology and spreading planting material to villagers across a wide area of West Timor. In those desa where extension efforts were undertaken from 1983–87, there are many native pastures with abundant Caribbean and Shrubby stylo, and backyard forage and seed production plantings with stylo and grasses. These were observed personally by the author during a visit to NTT in May 1989.

Whilst there is still a long way to go before improved pastures cover West Timor, the technology generated through research in NTT development projects, and initial extension efforts associated with these, provide a sound base for further development. Few development programmes in developing countries have the luxury of such abundant locally generated and verified technology. Given the importance of livestock and fodder, it is unfortunate for Timor that the final three years of pasture adviser input in the NTT Integrated Area Development Project (NTTIADP) were cancelled, without discussion with Dinas Peternakan, to allow appointment of a management adviser. This was a critical period when extension of verified pasture/forage technology should have been a priority.

The NTTIADP Mid-Term Review

Some comment needs to be directed towards the NTTIADP Mid-Term Review (Indonesia and Australian International Development Assistance Bureau 1989). This review paints a bleak picture of pasture, forage, crop and cattle development efforts in the project. The report highlights valid difficulties with technology transfer, like the newly developing Bimas extension system and the stipulation that inputs to villages under
the project would be confined to one year. These difficulties are more fully explained in Ayre-Smith et al. (1987).

However, many comments in the review about forage and pasture development are rather simplistic, and not very constructive. They have certainly done much to destroy the enthusiasm and commitment of two of the most experienced and field-active agencies in the project, Dinas Peternakan and Dinas Pertanian.

As discussed earlier, pasture and forage development are slow and difficult in semi-arid localities like Timor, where farmers live in a subsistence economy with almost no money, and cattle and overgrazing are facts of life. For over 300 years, it has been evident to, and emphasized by, the rulers of the day, that the defining features of the Timor area have been its poverty and ecological inadequacies (Ormeling 1955).

Advances must be won with commitment and patience. To judge the crop and pasture components established in the 1986–87 and 1987–88 wet seasons as a failure, on the basis of a two-week visit with only the odd day in the field in the late dry season in October–November 1988, seems rather cavalier and premature. The technology described above is valid and useful locally; it needs to be promoted persistently with appropriate modifications where necessary, rather than dismissed.

The review says that ‘a reorientation in field activities in cattle and fodder’ is necessary with ‘strengthened linkages to research organizations and an increased emphasis ... placed on village poultry’ (Indonesia and Australian International Development Assistance Bureau 1989: 17). In fact, other forage research organizations are in their infancy in NTT, and had no technology to offer in forage development as late as 1987; any technology generated should, of course, be utilized if appropriate. The plea for emphasis on village poultry seems to promote a swing away from a systems approach, although poultry and all other village livestock should obviously be considered. In addition, there is little locally verified technology appropriate in villages to warrant an emphasis on poultry in such a report, although such an emphasis may later prove appropriate.

The review further states that ‘activities ... focused on developing seed supply and marketing through the formal agency structure ... have not been effective’ (ibid.:9). The focus has in fact been through a mix of community/departmental and individual villager gardens. It is hard to envisage an alternative local system to start with when there is little seed
available, no farmer demand for or knowledge of the seed, and a subsistence economy where villagers have no cash. In fact, only one to two years after initial gardens were established, about a tonne of pasture seed (stylo, Clitoria, Siratro, Rhodes grass, Signal grass, Sabi grass, Gamba grass, Buffel grass) was collected from farmers and gardens in 1988–89 by the Dinas Peternakan. This may be the start of a small commercial industry, and it is reasonable to say that the October 1988 assessment of the review team is a little premature. Piggin (1985), McIvor (1986), Kerridge (1986), and Piggin et al. (1987) all recommended strongly the development of a local pasture seed industry.

Again, the review pronounces that ‘the project has had little influence in ... pasture improvement’ (Indonesia and Australian International Development Assistance Bureau:10). This is rubbish. There are many areas of natural pasture around Besi Pae, and also in ‘project phase 2’ desa such as Oebaki, TTS and Sasi, TTU, where there has been strong establishment of Verano and Seca stylo after sowing in 1986–87. I saw these on a visit to Timor in May 1989 and would estimate that carrying capacity has been significantly increased. Good stylo establishment is only evident in the second or third year after sowing in NTT. The review mission may have had difficulty in locating such areas on a two-week visit in the dry season, especially with minimal visits to the field and difficulties in communicating with Indonesian animal husbandry staff. The statement that ‘production technologies established at Besi Pae ... have not proved valid ... to the conditions of target farmers’ (ibid:6) is also rubbish. Pasture and forage species were tested widely over a range of conditions on and off Besi Pae. All species will not thrive in all situations in NTT, but the technology reported is valid. The assessment of the review is premature. In relation to the comment that ‘technology recommendations for improved ... fodder production were not practical under the uncontrolled grazing conditions of the project area’ (ibid.), the reply may be given that different species are adapted to grazed and ungrazed conditions. Certainly, it is very difficult to establish improved species in chronically overgrazed areas. However, grazing is controlled on many areas of Timor, and improved species can be established on these areas. The only answer in chronically overgrazed areas may be stock control. This assessment of the review is uninformed and premature.

The review also asserts that ‘the design expectation that known technology had the potential to improve cattle-based farming systems
has not been realised' (ibid.:11). This is rather too sweeping and, once again, premature. Several desa sown in 1986–87 and inspected in May 1989 had significantly improved legumes in the native pasture, and an obviously improved carrying capacity after the second wet season. Farmers in the Besi Pae area who received credit cattle and encouragement to establish pasture and forage gardens in 1983–85 are now well above a subsistence existence. Finally, the review comments that the 'livestock component activities for cattle do not address the basic problems of cattle production in the project area, and such activities have little prospect of providing benefits to target farmers. Sustainability is judged to be negligible ... there has been limited success in improving seed production and distribution systems for long-term sustainability' (ibid.:14). In answer, it may be said that low quantity and quality of feed, especially in the late dry season, are the major problems of the cattle industry. The pasture/forage component is directly addressing these problems with a relatively extensive technology package and program. Significant components of the technology have been used in Sikka and Amarasi since the 1930s, and these are being modified to account for the presence of the Leucaena psyllid in NTT. Components concerned with pasture species are being usefully implemented in grasslands, gardens and dam catchments.

The comments on pasture and forage development in the report can indeed be placed in context by considering the comment that dam 'construction progress... in terms of targets and quality is of a high standard' and 'the aim of PU achieving unassisted construction by year 3 has been attained' (ibid.:3). On a May 1989 visit to Timor, I inspected only two dams. Whilst the walls had been adequately constructed, both had serious problems. Spillways had not been finished and the bench, natural return slope and gully return were seriously eroded. Topsoil had not been placed over the wall and sown vegetation had not established. Fencing was strung across gullies allowing easy stock access, and wires had been wrapped around live tree strainers with the likelihood that fences will fail when trees are strangled. Both dams had certainly not been constructed to a high quality, and are likely to fail if not properly finished. A viable dam, revegetation and fencing technology certainly exists, but current technicians need to be made aware of it from earlier reports so that it can be consistently implemented. The review assessment of dam construction is grossly over-optimistic.
The value of Besi Pae

The NTIIADP review also casts some subtle aspersions towards Besi Pae:

several problems encountered ... [by NTIIADP] ... are attributable to the Besi Pae pilot phase. Besi Pae was research oriented, operated in a project mode, was located in a geographically discrete and relatively small area, and worked with only one counterpart agency ... Although the project is aware of the difficulties attributable to Besi Pae, and is tackling these issues, it will be difficult to completely divorce itself from the unrealistic expectations caused by the pilot phase (ibid.:23).

The responsibility for failure in NTIIADP is a heavy burden to place on Besi Pae. One may more reasonably argue that the success of Besi Pae made NTIIADP possible. Projects make their own success through effort, persistence and resilience; responsibility for failure really must rest with incumbent staff.

Besi Pae certainly deserves more positive comment. The Besi Pae project in fact achieved objectives within specified guidelines; it was an unqualified success. It was research-oriented, but was also extension- and training-orientated; all projects should encourage research to maintain a problem-solving capacity. It did operate in a project mode within Indonesian departments, but most activity in Indonesian departments (including NTIIADP) is budgeted and staffed in a similar project mode (as it is in Australian departments). It was centred in a ‘discrete’ area of four desa which covered several hundred square kilometres and contained perhaps 5,000–10,000 people, but it conducted dam, crop and pasture trials up to 50km distant and ‘phase 2’ preparation investigations over the whole NTIIADP area. It worked officially with Dinas Peternakan. but encouraged active cooperation with, and trained staff from, Dinas Pertanian, Departemen Pekerjaan Umum, Universitas Nusa Cendana and Sub-Balai Reboissasi Lahan Dan Konservasi Tanah; this cooperation was significant in shaping NTIIADP. It should not be necessary to be apologetic for encouraging high expectations.

It is an indictment of NTIIADP that Besi Pae has been neglected, although this is not surprising if review sentiments reflect current management opinions. It would also not be surprising if the Indonesians
were confused. Another NTTIADP review that stayed longer in NTT (Ayre-Smith et al. 1987) eulogized the value of Besi Pae as:

a unique resource which includes communities of Timorese farmers, extension and teaching resources, facilities for applied research, excellent buildings and workshops, dams, pastures, cattle and yards. [It could provide] a vision for the people of NTT [and it was] strongly urged that the impetus gained at Besi Pae during the first Indonesian–Australian project be regained as a demonstration to all of NTT that the future can be better than the present (ibid. 47).

The pleas fell on deaf ears.

Piggin et al. (1987) similarly recommended strongly 'that Besi Pae should remain and be further developed as a semi-arid, dryland agricultural research and training centre for NTT and Indonesia' (ibid. 2).

A weakness of Indonesian technical departments is a reluctance to visit farmers and the field; Besi Pae provided a unique and well-resourced centre to encourage field activity. Perhaps it is still not too late to revive this.

Conclusion

Livestock are the only substantial agricultural export from Timor, and the main problem for the industry is feed supply and quality. Pasture and forage development is a priority. A viable and extensive technology for development exists, due mainly to the efforts of the Indonesian–Australian projects. Initial extension of the technology has been reasonable, and the Department of Animal Husbandry (Dinas Peternakan) is enthusiastic and capable. NTT needs pasture and forage development, and it should receive positive support rather than unconstructive criticism from Australia.
Introduction

Food crops are an important component of the economy of NTT. Maize is the principle staple, and farming systems are oriented to this crop. Other food crops are grown with maize to complement the diet, generate income and provide an alternative if it fails. Rainfall is the main aspect limiting production, and cropping systems have evolved in NTT to reduce total crop failure due to drought or flooding. The existing cropping systems depend on limited inputs, but are labour-intensive. Horticultural crops are gaining prominence throughout the province as the economy moves into a cash economy.

The demand for food crops is increasing as the population rises. Food security is an important objective of the existing farming system. Coupled with this, farmers want to increase income. Cropping systems need to be designed to meet these objectives and minimize the effects to the environment. Development opportunities depend on the capability of the responsible government agency to undertake programmes. The level of commitment will dictate the methodology that development programmes will use. The main focus is to ensure that farmers have the opportunity to integrate food crops, livestock and estate crops into the system. Farming research and development techniques enable institutions to identify appropriate technologies.

Agriculture is the foundation of the NTT economy. Ninety per cent of the population is involved in agriculture, of which 96 per cent are involved in rice and upland crops, and 65 per cent in horticulture (Kantor Wilayah Departemen Pertanian 1989). Agriculture contributed to 64 per cent of the Regional Gross Domestic Product (RGDP) of this province in 1979 but by 1987, the contribution was reduced to 52 per cent. Between 1979 and 1987, the total RGDP for the province
### Table 11.1: Regional Gross Domestic Product and per capita income, NTT, 1979–87

<table>
<thead>
<tr>
<th>Year</th>
<th>Total RGDP</th>
<th>Agricultural sector</th>
<th>Food crops</th>
<th>Estate crops (small scale)</th>
<th>Estate crops (large scale)</th>
<th>Livestock</th>
<th>Fisheries</th>
<th>Forestry</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
<td>227,365,578</td>
<td>146,666,796</td>
<td>92,258,107</td>
<td>23,509,637</td>
<td>256,486</td>
<td>9,433,676</td>
<td>9,433,676</td>
<td>1,799,063</td>
</tr>
<tr>
<td>1981</td>
<td>343,395,362</td>
<td>203,947,436</td>
<td>122,922,053</td>
<td>26,598,882</td>
<td>290,962</td>
<td>14,979,283</td>
<td>14,979,283</td>
<td>3,274,830</td>
</tr>
<tr>
<td>1982</td>
<td>408,809,080</td>
<td>233,393,859</td>
<td>136,636,289</td>
<td>25,452,224</td>
<td>298,444</td>
<td>18,212,152</td>
<td>18,212,152</td>
<td>3,830,130</td>
</tr>
<tr>
<td>1983</td>
<td>493,932,450</td>
<td>282,626,514</td>
<td>171,266,187</td>
<td>25,463,282</td>
<td>321,045</td>
<td>17,054,809</td>
<td>17,054,809</td>
<td>4,153,443</td>
</tr>
<tr>
<td>1984</td>
<td>594,454,206</td>
<td>326,301,744</td>
<td>194,039,520</td>
<td>31,510,337</td>
<td>411,137</td>
<td>25,833,808</td>
<td>25,833,808</td>
<td>4,497,250</td>
</tr>
<tr>
<td>1985</td>
<td>659,415,925</td>
<td>356,707,661</td>
<td>216,373,313</td>
<td>32,300,348</td>
<td>380,850</td>
<td>27,023,224</td>
<td>27,023,224</td>
<td>4,518,745</td>
</tr>
<tr>
<td>1987</td>
<td>830,484,928</td>
<td>431,954,174</td>
<td>246,618,551</td>
<td>40,873,838</td>
<td>446,489</td>
<td>35,089,789</td>
<td>35,089,789</td>
<td>6,953,896</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of agriculture (%)</td>
<td>64.5</td>
<td>61.7</td>
<td>59.4</td>
<td>57.1</td>
<td>57.2</td>
<td>54.9</td>
<td>54.1</td>
<td>54.0</td>
<td>52.0</td>
</tr>
<tr>
<td>Per capita RGDP (Rp/Year)</td>
<td>84,457</td>
<td>101,414</td>
<td>119,878</td>
<td>139,487</td>
<td>166,109</td>
<td>192,646</td>
<td>208,949</td>
<td>228,423</td>
<td>251,720</td>
</tr>
</tbody>
</table>

Source: Kantor Statistik, 1976-88.
increased from Rp227 million to Rp830 million, with agriculture providing Rp147 million and Rp432 million respectively (Table 11.1). The contribution from food crops in 1979 was 62 per cent and in 1987, 57 per cent.

Although the contribution from food crops to the RGDP is declining as the economy moves from a subsistence to a cash economy, the staples maize, cassava and rice still represent the backbone of the economy. Livestock, estate crops and fisheries provide opportunities for the farming community in NTT to generate income. Farmers readily engage in these industries as long as they do not compete with the main food crop activity. Regardless of the returns that can be generated from other enterprises that may allow the farmer to purchase maize or rice, the principal objective is to produce sufficient food for household needs. The uncertainty of markets and dependence on traders necessitates that farmers ensure household needs are met before entering the cash economy.

Maize is the principal staple throughout NTT, but in areas where rainfall is below 900mm, sorghum is planted; above 2,000mm, rice is the main crop. Opportunities to improve production of these crops are discussed in this chapter, but it must be remembered that rainfall is the main factor dictating crop production. Other food crops are integrated in the system insofar as they complement the maize crop. Crops that compete against maize are not readily accepted. Approaches to develop and integrate other food crops into the system are also discussed.

Assistance for agencies involved in agricultural research and development would greatly aid the development of the food crops industry in NTT. With the population growing at 2.3 per cent per annum, food crop production will need to rise to meet increasing demand. Other agricultural commodities must also be integrated into the system to facilitate increasing farmer income. This chapter highlights where assistance from donor agencies should be directed in the immediate future.

Climate and other determinants

As highlighted above, climate is the main determinant affecting crop production, with rainfall being the chief factor. Rainfall in NTT ranges from <500mm in island of Savu to >3000mm in the highlands of West Flores and Sumba. The variability between seasons and within seasons is high. A two-week dry period at anthesis can severely reduce yields for
a determinant crop such as maize, although a two-week drought during the vegetative stage of the crop has less effect. It is impossible to predict when these drought periods will occur during the growing season, but on average they occur every season. Even in the same community, yield variations can be high as a result of the different times that farmers plant their crop. It is a question of luck whether your crop is at anthesis when the drought occurs, or whether your next door neighbour's crop planted two weeks earlier is at this stage.

Regardless of planting time, all crops in a particular area may fail because of a sudden end to the wet season. McWilliam (1985) has shown, in a survey of desa in TTS and TTU, that total crop failure may be as frequent as one year in five. A farmer is forced to plant as early as possible after the onset of the rains, and before weeds have started to dominate the garden. However, during this period rainfall is unreliable and the frequency of drought is high. Poor establishment of maize due to moisture stress in the first three weeks can reduce yields (Field (1988b) by as much as 25 per cent. The determinate crops (maize, mungbeans and peanuts) are more susceptible to periods of drought than indeterminate crops (sorghum) and crops that store their economic yield over a period of time (tuber crops). Fitzpatrick and Chapman (1988), using limited rainfall data, have attempted to predict potential yields for several crops in Timor and Flores, and have shown that moisture is a major factor limiting yield.

Drought is the expected norm in NTT. However, when the north-west monsoons are at their peak, excess rainfall is common between January and February. Crops can suffer from waterlogging, especially if drainage is poor. Soils can be waterlogged for a number of weeks after cyclonic activity. The farmer may have planted in an area chosen to ensure that the crop does not suffer from moisture stress, but the crop may then be inundated after a cyclone bringing over 250mm of rainfall in three days and may fail altogether in these situations. The ideal cropping area is one that has sufficient drainage to prevent waterlogging but is capable of storing sufficient moisture to ensure that the crop is not stressed during periods of drought. Ideal cropping areas are rare. Cyclonic activity at the end of the wet season is also common. Cyclonic activity in March 1989 resulted in over 200mm of rain in three days. The relayed mungbean crop in eastern Flores was decimated by these rains. Prediction of these storms is difficult.
Winds can also devastate a crop, and strong winds associated with cyclonic activity can destroy a maize plant burdened with a fully laden cob. The plant will break at the base, making harvesting impossible. Tall sorghum plants suffer the same fate. In the highlands where winds are a major problem, farmers reduce the area planted to maize, and plant sweet potato. The tall traditional varieties of maize are more susceptible to wind damage than the shorter earlier maturing varieties.

A wide range of soil types are found throughout NTT, and the soils of Timor, Rote, Savu and Sumba have a heavy texture, with clay contents often over 50 percent. These islands were formed by upliftment from the sea and the parent material is of marine origin. Limestone is a major constituent of the parent material, and consequently calcium carbonate dominates the soil profile. The highly calcareous soils result in phosphorous fixation, and soil pH ranges from 8–9 with some soils being sodic. It is common to see chlorotic plants as a result of iron and zinc deficiency. The soils have a very low organic matter content and available nitrogen is low. They are mainly composed of montmorillonite clays that swell when wet and crack when dry, and during dry spells and the dry season the soils have large cracks that tear the roots of perennial crops. When fully wet, water infiltration is poor, and the plant roots have difficulty in penetrating to any depth.

The soils of Alor and Flores, in contrast, have mainly derived from volcanic material, and are relatively more fertile than the soils of Timor and Sumba. But organic matter and nitrogen levels are generally low, and these soils derived from volcanic ash have a low water-holding capacity, which increases the degree of stress to the crop during periods of drought.

The relief of NTT is predominantly mountainous. Mountains cover 70 per cent of the terrain, and slopes of greater than 50 per cent are common. Soil losses are high as farmers are forced to crop areas with slopes greater than 20 per cent. At the start of the wet season, when gardens are bare, significant amounts of soil are lost, and Carson (1979) has indicated that soil losses may be as high as 200 tonnes/ha/year. In some situations there is very little topsoil, and crop yields are falling as soil fertility declines.

The availability of labour is a major factor influencing crop production, especially for land preparation and weeding. Permanent cropping areas need to be cultivated. On the heavy clay soils that are
prominent in NTT, draught animals are inappropriate, and cultivation by hand can require up to 200 man-days for one hectare. Land preparation on the sandier soils can be done by draught animals, but is rare. Farmers need to weed their crop at least twice during the growing season, and the most critical period is the first three weeks after planting the crop (Metzner 1980; Field 1986). Yields can be reduced by 25 per cent if weeding is delayed more than 25 days after planting. On heavy soils farmers have to use machetes or iron rods to pull out each weed, and such weeding can take over 40 man-days per hectare. On more friable soils weeding is faster, and the Dutch hoe is commonly used.

Pests and diseases also influence overall crop production. Insects are a major problem in grain legume crops, especially pod-sucking insects (Riptortus sp.) and the blister beetle (Lawn 1986; Field 1986), and chemical control is not readily available. Farmers grow crops that avoid insect attack, normally planting crops that flower and set seed into the dry season, but this approach sometimes fails as the crop may suffer from drought. Grain storage pests are a problem, especially for grain legumes (except peanuts), sorghum and millet. These crops are not protected by a pod or husk, as with maize, peanuts or rice, and farmers may lose the whole crop if insects are not adequately controlled. Rodents are a problem for grain storage, and for all crops during the time the crop matures in the field.

Livestock and feral animals are also pests, and in areas where cattle free-range farmers have to fence their gardens and spend the wet season protecting their crops. It can take over 40 man-days to fence one hectare. Fences are made of wood, and with the decline in the availability of timber, labour inputs are increasing. A fence will only deter some animals, as cattle can easily jump a 2m-high fence and fences rarely stop dogs getting into the garden. Maize is a major part of a dog’s diet and packs of dogs can destroy a crop in a night. As a result of this, farmers have to spend most of the wet season protecting their crop, which prevents them from undertaking other activities. But farmers prefer to abandon the ladang after the harvest of the maize crop, and the remaining crops are left unprotected. The necessity to guard crops is a major factor inhibiting farmers from undertaking multiple-cropping practices that involve managing a crop for two to five months after harvesting the maize crop. If the crop has to be guarded, farmers will prefer not to plant cassava or relay mungbeans into the maize crop. Bird attack is a major problem with sorghum and millet.
Most crops tolerate diseases. Peanut strip virus, which reduces yields by up to 25 per cent, is becoming a major problem in Flores, but is not currently found in Timor. Downy mildew is a major problem with maize, and farmers have to plant the maize crop in the early wet season before downy mildew becomes a serious difficulty (Field 1988b). Wasman (1988) has identified the main rice, maize and grain legume diseases in NTT and their relative importance for crop yield.

Current food crop production in NTT

Upland crops

Maize is the principal upland crop in NTT, and represents the main staple for farmers in the province. Several maize varieties are planted, with different maturity times and grain characteristics. The main varieties are Metro/Harapan mixtures that were introduced in the early 1960s. These varieties are 105-day maturing yellow-grain types that have replaced the traditional 120-day white/yellow-grain varieties. The introduced varieties are more suited to the region since they flower and mature during the wet season, thus avoiding the early dry season drought. Attempts to introduce earlier maturing varieties than Harapan/Metro have met with mixed success. The introduction of Arjuna (90 days' maturity) failed because of poor storage characteristics, even though it is capable of producing high yields (5 tonnes/ha). The sheath does not fully protect the cob, and weevils can enter and eat the unprotected grain. Apparently most early maturing types available in Indonesia exhibit similar storage problems to Arjuna. Farmers normally plant a small area of early maturing maize (60–75 days) in their house garden, so as to provide grain early in the wet season. White-grain varieties were the prominent traditional variety because they required less energy to cook and tasted better. However, these varieties are low-yielding (2 tonnes/ha) and susceptible to insect attack compared to the introduced yellow varieties (Field 1988b).

The maize crop is not provided with any inputs. The crop is planted at the beginning of the wet season in the house garden and the ladang, with the ladang providing the bulk of what is produced. Farmers plant 4–5 seeds per hole in a 1m grid and pumpkin and longbeans are commonly planted in the same hole. Farmers have adopted this planting arrangement to ensure that the crop is planted immediately after the onset of the rains. On flatter areas farmers are adopting the government
recommendation of planting the maize crop in 75cm rows, with 25cm between plants and two seeds per hole. However, this planting arrangement is difficult to carry out on the side of hills, and the traditional planting arrangement is still common. The recommended planting arrangement increases crop yields, but also lengthens the planting time from four man-days/ha (under the traditional system) to 12 man-days/ha for the recommended system. Rainfall events at the start of the wet season are irregular and periods of drought (two to three weeks) are common. Thus even though they realize that potential yields are lower, farmers are predisposed to adopt the faster planting arrangement to ensure that the crop establishes before soils dry out. The crop is harvested at the start of the dry season and is stored in a dry environment.

Farmers plant tubers to complement their diet and provide a crop if the maize fails. Yams (Dioscorea spp.), cassava and sweet potatoes are the main tuber crops. Cassava is intercropped with maize, and rainfall distribution and certainty dictate the amount planted by a farmer. In areas where wet season drought is more prevalent (e.g. the eastern part of West Timor), cassava constitutes a greater proportion of the wet season crop. Cassava is less susceptible to wet season drought than maize and is capable of producing a crop even if the maize crop fails. Rainfall events are common during the southeastern monsoons in eastern West Timor, which provides opportunities for cassava to continue producing a yield into the dry season. In western West Timor, the rains fall in a four-month period which is insufficient for the cassava to produce a yield that can be harvested in the first year of planting, and farmers may have to wait eighteen months before the crop harvesting. Government programmes have been directed towards requesting farmers to plant cassava, especially in areas where wet season drought is common and the southeast monsoons extend the length of the growing season. Cassava is harvested when necessary, and suffers from very few storage problems as the living plant is stored in the soil. The main problem is that the crop takes at least ten months to mature and needs to be protected from animals.

Sweet potato is planted as a sequential crop after the maize has been harvested, generally in areas where rainfall is adequate as a result of the southeast monsoons. In areas where the growing season is shorter, sweet potatoes are relayed into the maize, approximately 80 days after planting the latter and as its canopy opens. A range of sweet potato types
are planted throughout the province, depending on farmer preference and the cropping system. Giant yams are mainly planted in the house garden, generally up to ten plants per garden. The yam produces a large tuber, and is harvested as a last resort when maize and other tubers are in short supply.

**Grain legumes**

A wide variety of these are planted by farmers in NTT, and pigeon peas, cowpeas and a range of *Dolichos* species are intercropped with maize. Cowpeas and *Dolichos* are harvested during the wet and early dry season. They produce green pods, and as the crop matures, the farmer harvests the grain. They are mainly climbing legumes and the growing maize plant acts as a support for the grain legume. These legumes flower and produce pods into the dry season if the soil water reserves are recharged as a result of dry season rains. Pigeon peas are later-maturing (normally 180 days) and are harvested in the mid- to late dry season, depending on the variety. These grain legumes are generally "opportunistic" crops that produce some yield to complement the maize.

Peanuts are an important cash crop in some areas of NTT, being mainly grown as a monocrop in a small area (say, 25x25m) in the *ladang* (Nusa Tenggara Agricultural Support Project 1988), and being planted after maize is established. Peanuts compete with maize for resources, and only farmers who have planted sufficient maize for household needs plant an additional area to peanuts. Thus Subandi *et al.* (1988) found in Kabupaten Kupang that only farmers who cropped in excess of 0.5ha of maize were capable of planting peanuts. The crop is given no inputs, and is planted in a 25x25cm grid, with yields of approximately 800kg/ha. The high cost of planting material (Rp1,500 per point) is a major factor limiting the area planted by farmers, coupled with the greater labour requirement compared to maize.

Mungbeans are important throughout NTT, and in drier areas (rainfall <900mm), are grown as a full season crop. On the island of Savu, farmers have successfully bred a variety adapted to the environment. In areas where the growing season is approximately five months and rainfall between 900–1,200mm, farmers relay mungbeans into maize, as the latter's canopy opens. In areas where rain is common during the southeast monsoons, farmers sequentially plant mungbeans after harvesting maize. The main mungbean varieties planted throughout NTT are 90-day maturing that produce on average 250kg/ha. They
grow tall and vegetative and lodge without producing any yield if supplied with too much moisture, and are accordingly planted when rainfall frequency is low.

*Cereals*

Sorghum, upland rice and millet were the main cereals before the arrival of maize and are still planted throughout NTT to some degree. Upland rice is concentrated in areas where rainfall is above 1,500mm and the growing season is more than 120 days, with a wide range of traditional varieties being planted. As weeds are a problem, farmers plant maize in preference to upland rice. Sorghum is planted in areas where rainfall is unreliable and where rainfall is below 900mm (e.g. Savu), it is the main cereal. In areas where rainfall is between 900–1,200, sorghum is intercropped with maize, especially where wet season drought is common. The traditional varieties are tall (3m), have an open inflorescence, which reduces damage from birds, and take over 120 days to mature. The crops mature well into the dry season, so that the maturing seed head avoids early dry season storms, and fungal diseases are avoided. The main millet varieties planted are *Setaria* spp., grown either as a monocrop or intercropped with maize. Millet is a highly preferred cereal, but labour inputs are high, weeds are a major problem, and the crop needs to be protected from bird attack.

*Irrigated and rainfed rice*

Irrigated rice is a minor crop in NTT, and of the 50,000ha planted over 20,000ha are in Kabupaten Manggarai (*Kantor Wilayah Departemen Pertanian* 1989). Crop yields are 3.7 tonnes/ha in an intensive system, and 2 tonnes/ha without inputs. Several varieties have been introduced into the system, namely IR 64, IR 36, Cisadane and Dodokan. The crop is occasionally sprayed if spray equipment is available. The crop is planted in mid-wet season after the soil has been sufficiently wetted and can be cultivated, and where irrigation water is available, it is used to supplement wet-season rainfall while a dry season crop is planted. Irrigated rice is found near springs, rivers and streams, and usually simple diversion structures of stone and cement direct the water to unlined channels, leading to the *sawah*. Most irrigated rice is transplanted after seeding in nursery beds, and fertilizers are readily used, comprised mainly of urea and triple superphosphate. This sug-
gests that farmers are aware of the benefits of fertilizers, but are only
prepared to use them on crops that are not going to be affected by
drought (as are upland crops). One problem of irrigation is that the
channels are destroyed or silt up during the wet season, making it
difficult to provide supplementary irrigation when the rains cease. The
rice-planting system is discussed in detail by the Canadian International
Development Agency (1980) and by Maamun et al. (1987).

Wet-season rice on the lowlands is predominantly rainfed, and the
high rainfall (<2,000mm) areas of Sumba Barat and Manggarai are the
most productive areas in NTT. The seed is drilled into the wet seedbed,
or occasionally broadcast and fertilizers are seldom used.

The soils for wetland rice production are usually the heavy clay
which is common throughout NTT. This is easily puddled, and reduces
the percolation of water and loss of nutrients. Most such soils are de­
ficient of nitrogen, and zinc and iron deficiency is common in calcareous
phases. Although the heavy clay is suited to rice cropping, it is difficult
to cultivate, and farmers have to wait until the soil is sufficiently wetted,
which means that they plant their crop in the mid-wet season. They usually
use the rencah system (Nusa Tenggara Agricultural Support Project
1988), where they herd cattle repeatedly over and around the fields until
the grass weeds are submerged and the soil puddled. Tractors and draught
animals are gradually being used to assist in land preparation, as the
availability of cattle under the rencah system becomes more difficult.
Liem et al. (1988) evaluated several land preparation techniques for
sawah, and found that all systems require large amounts of energy.

The availability of water by either irrigation systems or rainfall is
a major constraint for wetland rice, which should ideally be inundated
to assist the control of weeds. Hence in situations where the crop is not
inundated, the crop may have to be weeded four times—compared with
the usual one time—and this significantly increases the labour inputs
(Djamaludin et al. 1989). Cyperus sp. and Echinochloa sp. are the main
weeds. Water stress can also affect yields, especially with the
high-yielding introduced varieties that are becoming available, but
conversely plants can be severely damaged if flooding occurs. Water
stress at establishment reduces tillering, and at heading reduces grain
yield. Irrigated crops planted in the late dry season occasionally suffer
from water stress but rainfed crops are much more susceptible.

There are very few pests and diseases for the rice crop. ‘Tungro’ has
been identified in Lembor, and research is currently under way to
identify suitable rice varieties for the region which are also resistant to it (Rahamma et al. 1989). A connected factor is the staggering of plantings caused by the need of farmers to wait for cattle or tractors in order to cultivate; the farmers who are last to plant run into problems not only of moisture stress, but also of the build-up of pest population due to earlier plantings which can significantly reduce the yield of later crops. Thus Sama et al. (1989) showed that rice yields were significantly lower from plantings in March compared to January, due to increased insect attack where *Nymphula depunctalis* populations had significantly increased before the later crop was harvested. The Canadian International Development Agency (1980) lists the main insects attacking rice. Rodents and birds are also a problem, and farmers have to continually guard the crop from the latter during the day.

**Horticulture**

The horticultural industry in NTT is still small. Bananas and papaya are planted by most farmers for household consumption, where papaya leaves, flowers and fruit are important components of the diet and households will have several male and female plants scattered throughout their gardens, based on personal needs. Bananas have two main purposes: one to provide fruit, and second as a source of water for livestock. Banana stems contain 95 per cent water and are fed to cattle to provide water and some carbohydrate, especially in areas where the former must be carted over long distances. The main commercial fruits are citrus, mangoes, avocados, pineapples, soursop, custard apples and jackfruit, whose excess production is sold as an extra source of income for the household (Baker 1988; Chapman 1986). No inputs are provided, and yield depends on the season.

Perishable vegetables which mostly consist of tomatoes, cabbage, mustard plant, Chinese cabbage, longbeans and eggplant are chiefly planted near Kupang and the main kabupaten towns, where water for dry-season irrigation is available. Some perishable vegetable production occurs in the highlands, but difficulties in marketing restrict the area planted. are the main vegetables.

Garlic is important and mainly grown in the highlands during the southeast monsoons but is destroyed by fungal diseases if rainfall is too high. It is cultivated in areas where dry season rainfall does not exceed 500mm. Spring onions are grown in the lowlands during the dry season,
and are irrigated from nearby rivers or springs. No inputs are supplied, except for manure and ash.

Availability of planting material is one of the main constraints limiting horticultural production, especially for vegetables. Farmers are apprehensive about purchasing seed if they are uncertain about the viability of the seed, but more often than not, old seed that will not germinate is sold. Seedlings of suitable fruit trees for NTT are in short supply, and most varieties are better suited to the wet tropics of Java (Baker 1988). Chemicals to control pests and diseases are not readily available, and spray equipment is often too expensive to be purchased by an individual farmer.

Market opportunities for perishable vegetables are limited. Kupang is the main market, while consumers of vegetables in the kabupaten and kecamatan towns are mainly public servants with limited funds. The marketing of less perishable vegetables and fruit is controlled by a few traders while frequently buy the crop before harvest under the ijon system at a significantly lower price which farmers' need of cash forces them to accept. Read and Sturgess (1988) have discussed opportunities for further expansion of these markets.

Wet-season vegetable production is non-existent, because of the need to provide chemicals to control pests and diseases. The predominantly temperate/subtropical vegetables are ideally suited to the early dry season, when insects are not a problem, and the mild climate is ideal. An adequate water supply is important for vegetable production, and most crops are hand-watered, meaning that the area a farmer can effectively manage is restricted and inadequate watering often occurs. Only in areas where irrigation systems have been developed have furrowed irrigation systems been adopted, as is the case with Taurus near Kupang. The high labour requirement involved in vegetable production, especially for watering, is a major factor hindering production, and the need to grow vegetables during the early dry season competes with other activities, including early dry-season rice production (Subandi et al. 1989). The two crops are normally grown in the same area due to the availability of water for irrigation. It should be noted that poultry need to be caged if farmers grow vegetables in the house-garden, as free-ranging birds in pursuit of insects will destroy the plants (Nusa Tenggara Agricultural Support Project 1988)).
Prospects for increasing food crop production in NTT

Based on the above conditions, several projects are currently involved in identifying and developing appropriate technologies to improve food crop production in NTT. The Agency for Agricultural Research and Development (AARD), through the Nusa Tenggara Agricultural Support Project (NTASP), has been requested by the government to identify areas where agricultural production can be improved, and food crops are an important component of the project. The project began in 1986, and over the last three years has begun to identify how food crop production can be stabilized and if possible increased, thus raising farm incomes.

Opportunities to improve production are discussed at two levels. Under the 'low input' system, opportunities based on the current resource base are considered, and the capability of government agencies to undertake the programme is examined. The recommendations emerging from this discussion can be implemented in the short term, if deemed appropriate. Under the 'high input' system, opportunities, given a significant improvement in the resource base, are discussed, and the capability of the agencies involved to undertake such a programme is reviewed. The costs of a high input system will be high, and need to be carefully weighed against the benefits from embarking on it.

Upland crops

Low Input. Rainfall is the main constraint governing upland cropping, and regardless of alterations to existing cropping systems, in some years crop production will be low or even fail. Opportunities that reduce the degree of risk need to be identified. Multiple cropping, which includes intercropping, relay-cropping and sequential cropping, provides an opportunity to increase overall production at a low input level, and to reduce the degree of risk.

Intercropping is a major component of existing cropping systems, and although yields may be lower for an individual crop, farmers can optimize production regardless of the type of wet season. The main approach involves crops that do not compete against maize, crops that mature after the maize harvest—cassava, sorghum and pigeon peas—and those that grow on residual soil moisture. Crops that have a similar growing period to maize, e.g. peanuts, are not well accepted because they compete for available resources, which means that the maize population would have to be reduced, thus reducing its potential yield and the amount of food available for the household. Salem et al. (1989a,
1989b), Bahtiar et al. (1989) and Zubachtirodin (1989) have studied the effects of intercropping peanuts and maize on maize yield.

Relay-cropping with short duration crops is a common practice that can be further developed. Planting early-maturing peanuts (80 days), sweet potato and cowpeas warrants further consideration, where these crops are planted as the maize crop matures and the canopy of the maize crop opens. New ‘lines’ of early-maturing peanuts, sweet potato and cowpea are required for NTT. Sriwidodo and Soepadmo (1989) have identified lines of sweet potato capable of producing over 20 tonnes/ha. Field and Kameli (1986) and Mustari et al. (1989) have identified several promising lines of mungbean for NTT that are also adapted to calcareous soils; these improved lines are capable of producing over 1.2 tonnes/ha in 60 days, compared with 0.5 tonnes/ha in 90 days with traditional varieties.

Sequential cropping offers similar benefits to relay-cropping, and similar early maturing varieties can be planted after maize if there is sufficient moisture. It is suited to areas where there is significant rain during the southeast monsoon.

Early-maturing varieties of maize allow relayed or sequentially planted crops an opportunity to make better use of available soil water, since they can be planted earlier and may have a better chance of avoiding end of wet-season drought (Fitzpatrick and Chapman 1988). The main problem is that appropriate early-maturing lines are not readily available (Mustari et al. 1989b), and further work is required to find more suitably adapted varieties.

A further approach is intercropping perennial crops with annual crops, which significantly reduces the degree of risk but may reduce annual crop yields. Alley-cropping or tree legume intercropping is one method of incorporating perennial crops with tree legumes. Field (1988a and 1989) has discussed how alley-cropping complements the annual crop by supplying nitrogen and reducing soil erosion, and reduces the labour requirement for weeding and land preparation while also providing supplementary benefits, e.g. firewood, fodder and fencing materials. The tree legume is pruned to reduce competition with the annual crop, and after harvesting the annual crop, the tree legume is allowed to grow on residual soil moisture to produce fodder and timber. The yield component of the tree legume is less susceptible to the climate, and if soil moisture conditions are favourable the plant will continue to grow. The farmer will have more feed to fatten cattle, and the leaf can also be used to increase soil fertility for the following wet
season crop. Jones (1983) and Metzner (1981) have discussed how tree legumes have been useful in stabilizing farming systems and improving food crop production in NTT.

Intercropping with coconuts, cashews, candlenuts, lontar and other perennial tree crops is common throughout NTT, where the trees are spaced to reduce competition with the annuals and produce an adequate yield. It is interesting to note that farmers did not adopt the high-yielding dwarf varieties of coconut because they could not plant maize under them, even though these trees significantly increased coconut returns. Perennials are less susceptible to the vagaries of climate, and more likely to produce a yield in all conditions, while trees are harvested in the dry season and do not compete with the maize for labour.

**High Input.** Most annual crops respond to inputs of fertilizer, other chemicals and labour. Generally, soils in NTT are deficient in nitrogen, and respond especially to additional inputs of this. The Food and Agriculture Organization (1985) has identified the nutritional requirements of crops grown throughout NTT, and Field (1986) has that maize yields can be significantly increased with additional nitrogen inputs. The Nusa Tenggara Agricultural Support Project (1988), Subandi *et al.* (1989), Djamaluddin *et al.* (1989) and Momuat *et al.* (1989) have shown

| Table 11.2: Returns from cropping patterns* for upland fields, Kabupaten Kupang, 1988/89 wet season |
|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|
| Pattern | Gross returns (Rp) | Total variable Cost (Rp) | RAVC<sub>b</sub> (Rp) | Rate of return (%) to: |
| A: Existing cropping pattern - maize + pumpkin + longbeans | 229,500 | 68,900 | 160,600 | Material costs |
| B: Maize + peanuts + cassava | 1,613,600 | 554,400 | 1,059,400 | 4.0 |
| C: Maize + soybeans + cassava | 1,103,800 | 320,500 | 783,300 | Labour |
| D: Maize/mungbeans + cassava | 1,417,400 | 298,200 | 1,173,200 | 9.5 |

Notes:
*Patterns:
A: Existing cropping pattern - maize + pumpkin + longbeans
B: Maize + peanuts + cassava
C: Maize + soybeans + cassava
D: Maize/mungbeans + cassava
<sup>b</sup>RAVC = Return Above Variable Cost
Source: Momuat *et al.* (1989)
that farmers’ incomes can significantly increase with improved cropping practices. Table 11.2 demonstrates for Kabupaten Kupang the differences between farm incomes from these and the existing cropping pattern. Input costs for improved packages are significantly higher especially for Pattern B due to the high cost of peanut seed. Labour inputs are significantly higher in the improved packages, but are fully compensated for by higher returns.

These improved practices are dependent on the availability of the extra inputs, fertilizers and chemicals, a ready access to credit, and an extension service that is capable of providing advice. Improved crop varieties will certainly respond to better crop husbandry practices, but the benefits must be carefully weighed against the costs of implementing such a system.

Rice

Low input. Reducing the incidence of crop failure due to water stress, especially for rainfed rice, will significantly increase crop yields, and here technologies that allow the farmer to plant early so as to avoid end-of-season drought need to be examined. Two such techniques are currently being evaluated by AARD in NTT, namely the Gogorencah and the dry seedbed preparation system, both which allow the farmer to harvest his crop before the start of the dry season. Normally the farmer plants rice between late January and February.

Under the Gogorencah system the farmer plants at the beginning of the wet season; preparing the land before then, and requiring a lot of energy to till the soil. If large 65hp tractors are not available, crowbars are used, and farmers can take over 200 man-days may be needed to prepare one hectare. Seed is drilled at the start of the wet season, before weeds have dominated the field, and although water stress is common during establishment, the probability of stress at heading is significantly reduced. Seed rates are increased to compensate for reduced tillering.

Under the dry seedbed system, farmers raise seedlings in areas that are near reliable water supplies and by the time the seedlings are ready for transplanting, the soil is sufficiently wet to facilitate cultivation. Labour inputs for land preparation are significantly reduced, and the crop is harvested one month earlier than in the traditional system with significantly higher yields (Nusa Tenggara Agricultural Support Project 1988). In 1986–87 the rice crop failed when planted under the normal practice because of the early end to the wet season, but other systems allowed the farmer to realize a crop of between 1–2 tonnes/ha (Figure
Figure 11.1: Rice yields under three planting systems, Naibonat, NTT, 1986/87–1988/89

![Bar chart showing rice yields under three planting systems, Naibonat, NTT, 1986/87–1988/89. The systems compared are Farmers' existing system, Gogorencah, and Dry seedbed.](image1)

Figure 11.2: Farmers' incomes from rice production under three planting systems, Naibonat, NTT, 1986/87–1988/89

![Bar chart showing farmers' incomes from rice production under three planting systems, Naibonat, NTT, 1986/87–1988/89. The systems compared are Farmers' existing system, Gogorencah, and Dry seedbed.](image2)
Even in years of reasonable performance, the farmer’s income is significantly increased with the dry seedbed system compared to both the existing system and Gogorencah (Figure 11.2).

Rice varieties planted in NTT usually take 120 days to mature, but early-maturing varieties that are resistant to disease, adapted to the environment, and will flower during the wet season and avoid end-of-wet season drought, are currently being identified. Sriwidodo and Soepadmo (1989) have identified suitable lines for Timor and Flores that can be planted under the Gogorencah system.

**High input.** High input systems are dependent on reliable water supplies, and the costs of developing irrigation systems need to be fully weighed up against their expected benefits. Here it should be realized that if the benefits from irrigation improvements are to be secured, the infrastructures to supply seed, fertilizers and chemicals, to organize credit and to offer extension service need to be improved. Several projects in NTT, co-financed by CIDA and the Asian Development Bank (ADB), are currently assisting in the development and maintenance of irrigation systems.

Experience from other parts of Indonesia has demonstrated that rice production can be significantly increased with improved resources. The cost is high, however, and the appropriateness of proposals needs to be fully examined.

**Horticulture**

**Low input.** Horticultural production can be significantly improved through improved access to planting materials and through increasing the range of crops available to farmers. For vegetables, supply systems that allow farmers to purchase high-quality viable seed will significantly improve production in the short term, but it must be appreciated that farmers are apprehensive about purchasing seed because they are uncertain about its viability. The Nusa Tenggara Agricultural Support Project (1988) has shown that with Rp8,000 worth of seed, a farmer can realize a net return (over and above seed costs) of Rp94,700 from vegetable production in the housegarden. The main advantage of such production, if water is available, is that it is a dry season activity and is conducted when there may be excess labour available on the farm.
Vegetables that can be readily stored and sold when the market commands a worthwhile price need to be examined. Garlic, onions, potatoes and chillies can easily be stored, and farmers can sell these crops when they need money. But planting material is an important prerequisite for such development and the initial outlay for garlic seed planting material, Rp8,000/kg, is a major deterrent.

The successful citrus distribution programme in NTT demonstrates the value of distributing fruit trees that produce an economic yield with limited inputs, and similar programmes with other tree crops could also realize benefits. The main factor limiting fruit tree production is the availability of planting material for the diverse range of agro-ecosystems found throughout NTT. But fruit tree introduction from other locations in Indonesia and outside Indonesia could greatly improve the range of crops available to farmers and the supply of fruit to the markets.

High input. Vegetable production can be significantly increased with the addition of insecticides and fertilizers and the improvement of the supply of water. The cost of fertilizers and insecticides is low compared to the cost of the seed, but distribution systems need to be developed to increase the availability of these inputs.

Other factors to be considered

The availability of land for cropping is a major concern that needs to be fully appreciated. In some parts of NTT, suitable land is in short supply, and a family may only have 0.1ha for cropping. This is in contrast to other areas where a family may have over 30ha. Such uneven distribution can occur within a kecamatan, and development recommendations must be fully appreciative of this aspect. The Department of Agriculture recommends that development should be focused on agro-ecosystems or Pewilayan Pertanian, in order to ensure that recommendations are not bound to the constraints that can occur if development is restricted only to administrative boundaries. More intensive farming systems will be developed in densely, compared to less densely, populated areas.

Land tenure is also a problem in areas where demand for this resource is high. In the densely populated areas of Flores, sharecropping is common for wet-season crops including irrigated rice, and practices that disadvantage the share farmer are common. The harvested
crop is usually divided 50:50, with the share farmer providing all labour inputs and fertilizers or chemicals. Legislation providing for an even sharing of input costs, distributing 60 per cent of the harvested crop to the sharecroppers and 40 per cent to the landowner, is rarely enforced.

As the demand for land is increasing, equitable land tenure systems need to be identified. If not, farmers may be apprehensive about adding inputs and sharecroppers will seldom adopt technologies that reduce land degradation if there are no immediate benefits.

**Spheres for assistance**

There are several key government agencies responsible for developing agriculture in NTT, and donor bodies should be aware of their responsibilities so that they can target assistance appropriately.

**Kanwil Pertanian**

The Kanwil Pertanian is responsible for coordinating all agricultural activities in the province. This includes coordinating agricultural planning, and supervising, monitoring and evaluating activities undertaken in the agricultural sector. The head of the regional office is ultimately responsible for all their activities, which include research, extension, training, communication, quarantine, and sectoral agencies involved with agricultural inputs.

**The Agency for Agricultural Research and Development (AARD)**

This national agricultural research organization has the mandate to evaluate appropriate technologies in the region. Through the assistance of the World Bank and the United States Agency for International Development (USAID), three research institutes have been set up in NTT during the last three years. Staff from AARD are actively involved in research and development activities, which are farming systems-rather than community-oriented, and much of the information cited in this chapter results from this work. The presence of AARD in NTT needs to be strengthened, for the numerous problems identified above still remain to be solved. The World Bank and AIDAB-funded NTASP is associated with AARD, as already mentioned, and is also taking a total farming systems perspective where it believes that the interaction and combination of the diverse range of options available to a farmer needs to be maintained.
**Bimas**

The extension service is now multidisciplinary, and again not directed towards individual commodities. Extension officers are now under the supervision of *Bimas* and are directly responsible to the head of the *Kanwil Pertanian*. Funds are urgently needed to help the NAEEP in training these officers, who were mainly food crops-oriented.

**Dinas Pertanian Tanaman Pangan**

The availability of seed or planting material is a key component limiting agricultural development in the region. *Dinas Pertanian Tanaman Pangan* is responsible for supplying planting material, and the basic infrastructure has been set up. However, with limited resources and funds, the *Dinas* is not currently capable of meeting industry needs, and if new varieties are identified that produce significantly higher yields than the existing local varieties, its capability to produce and distribute seed will have to be strengthened. The Seed Certification Branch will have to be further enhanced to ensure that high-quality seed is made available to farmers. While superior seed from outside NTT can be introduced, ideally the province should be independent and capable of producing its own seed. Simpson (1988) has discussed the seed industry in NTT, and provided recommendations concerning where assistance should be directed.

The capability of the *Dinas* to monitor and develop markets also needs to be improved. As farmers become more dependent on commodities that are traded, they must be made aware of how the markets perform, through radio and other means, to reduce the dependence of farmers on the *ijon* system.

As markets develop and incomes rise, the need for fertilizers and other inputs will increase. *Dinas Pertanian*, together with *PT Pertani* and *PT Pusri*, will have to improve their capability to ensure that inputs are available.

**Conclusion**

Opportunities to increase food crop production in NTT do exist. Modifications to the existing cropping system can increase production and, more importantly, assist in stabilizing it. Multiple cropping techniques complement the existing system, and allow the farmer to incorporate alternative food crops in it. But rainfall is a major factor
limiting output, and regardless of the cropping system, total crop failure or severe depression of yields will occur in some years.

The key to successful agricultural development is to ensure that there is a range of options available to the farmer, and depending on the agro-ecosystem, livestock, fisheries, estate crops and forestry can be integrated into the farming system. Farming systems research and development addresses this problem, and ensures that the multitude of factors that comprising a farming system are examined.

The farming systems approach to development is gaining wider attention in NTT, and development programmes are becoming less commodity-oriented. Projects that are flexible and can easily fit into the diverse range of agro-ecosystems that are found throughout NTT will be more successful in assisting farmers. Although this chapter discusses food crops development, it must be stressed that all aspects of farming systems need to be improved, including the whole range of on- and off-farm activities.

In the end, farmers themselves will decide on the best options, based on their needs, capabilities and preferences, and development programmes should facilitate this process. The level of assistance a government can provide depends on the cost and returns of such programmes, and on how they fit into the overall plan for the province.
Introduction

Until the end of Repelita IV, the structure of the NTT economy was still dominated by agriculture, which generally only provided farmers’ subsistence needs. Surplus agricultural and forest products which could be used as raw materials for industry, especially primary commodities traded between islands, were still very limited, both in range and volume. Although the government has tried to develop industry in this region, for example by establishing cement and cotton processing factories, the role of industry is still relatively weak. This is reflected in the contribution of the industry sector to the Regional Gross Domestic Product (RGDP), which is only about 2.1 per cent (1987, based on 1983 constant prices). A large proportion of existing industries are in the small and cottage categories, being generally informal and traditional in character.

As the results of the joint study by Mercu Buana University and the Australian National University (Barlow et al 1990) have already shown, there are opportunities which could be developed in the industrial sector, but also many underlying obstacles. These include the low calibre of human resources, socio-cultural difficulties, natural resource limitations, poor quality raw materials, and inferior infrastructures and transportation, all of which still require attention. Therefore in trying to address the aspects of industry raised in the MBU-ANU study, I will provide brief sections on the background, problems and prospects of industry in NTT.

Background to industry and its role in the NTT economy

NTT industry is dominated by small units using simple technology. This is in terms of numbers where such units comprise 99.5 per cent of
the total, the absorption of labour, and the value of production. The largest industrial concern in NIT is the Kupang cement factory. Medium-sized industries include cotton processing, sandalwood oil production, cold storage, sawmilling, and incense-making. Table 12.1 shows the situation of industry in NIT during the first semester of 1989, according to size grouping.

Although industry in NIT is in its early stages and its contribution to RGDP small, it has good potentials for growth if viewed according to the following indicators:

1. The industrial sector, particularly small cottage industry in the rural areas, is a sphere where farmers can increase their incomes, although this may be in the form of secondary activity carried out in slack periods and supplementing their income.

2. Small industry including weaving, palm/red sugar making, coconut oil production, and sawmilling, is already widespread across a large number of villages in NIT.

3. There are several manufactured products made within NTT which can meet all, or a large proportion of, local demand, but which until now have had to be imported from outside the province. These include cement, furniture, printed matter, floor tiles, and corrugated iron sheeting.

4. The processing of agricultural and forest products already raises value added, but industrial development which would enable this to be lifted further is quite feasible.

5. The sandalwood processing industry, which produces sandalwood oil and pulp, statues, sandalwood carvings and incense, can raise the value added through exports, and at the same time raise the country's reserves of foreign exchange.

**Industries in NIT**

There are already some industries quite well established in NTT, and these are now detailed.

*Small weaving industry.* Of the total of 429 listed centres of small industry at the end of 1988, 207 were ikat weaving centres (Table 12.2) which are spread through the majority of villages in NTT. In these centres there is a total of approximately 11,000 units, in the form of small cottage handicraft industries absorbing a labour force of about 16,000 people. Nearly every kabupaten throughout NTT has its own
Table 12.1: Industry in NTT, first semester, 1989

<table>
<thead>
<tr>
<th>Industry group</th>
<th>No. of units</th>
<th>No. of workers</th>
<th>Value of investment (Rp '000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic chemical industry (large)</td>
<td>1</td>
<td>274</td>
<td>24,911,180</td>
</tr>
<tr>
<td>Medium size industry</td>
<td>28</td>
<td>1,006</td>
<td>3,652,902</td>
</tr>
<tr>
<td>Small industry</td>
<td>20,543</td>
<td>37,977</td>
<td>3,288,037</td>
</tr>
<tr>
<td>Total</td>
<td>20,672</td>
<td>39,257</td>
<td>31,852,120</td>
</tr>
</tbody>
</table>

Note:
*A 'large' industry comprises firms employing 100 or more workers, while 'medium' industry comprises those employing 20 to 99 workers. 'Small' industry comprises firms with 5 to 19 workers.

Table 12.2: The status of industry in NTT, 1988

<table>
<thead>
<tr>
<th>Industry</th>
<th>Centres(^a)</th>
<th>Units(^b)</th>
<th>Workers employed</th>
<th>Value of production 1988 (Rp million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaving (Ikat) (small)</td>
<td>207</td>
<td>11,000</td>
<td>16,000</td>
<td>n.a.</td>
</tr>
<tr>
<td>Palm sugar (all small)</td>
<td>76</td>
<td>5,780</td>
<td>11,500</td>
<td>238.4</td>
</tr>
<tr>
<td>Coconut oil</td>
<td>28</td>
<td>879</td>
<td>1,800</td>
<td>759.0</td>
</tr>
<tr>
<td>Furniture, household utensils, and office equipment (all small)</td>
<td>n.a.</td>
<td>348</td>
<td>1,000</td>
<td>3,963.9</td>
</tr>
<tr>
<td>Printing and publishing (76 small and 7 medium)</td>
<td>n.a.</td>
<td>83</td>
<td>421</td>
<td>1,317.3</td>
</tr>
<tr>
<td>Salt (all small)</td>
<td>n.a.</td>
<td>850</td>
<td>1,850 (2,000 tonnes)</td>
<td></td>
</tr>
<tr>
<td>Brick (all small)</td>
<td>30</td>
<td>781</td>
<td>2,600</td>
<td>471.9</td>
</tr>
<tr>
<td>Coconut products (sizes not known)</td>
<td>n.a.</td>
<td>107</td>
<td>624</td>
<td>881.6</td>
</tr>
<tr>
<td>Essential oil (47 small and 2 medium)</td>
<td>n.a.</td>
<td>47</td>
<td>185</td>
<td>3,101.4</td>
</tr>
<tr>
<td>Salted fish</td>
<td>n.a.</td>
<td>122</td>
<td>211</td>
<td>137.4</td>
</tr>
<tr>
<td>Coffee processing (sizes not known)</td>
<td>n.a.</td>
<td>7</td>
<td></td>
<td>53.9</td>
</tr>
<tr>
<td>Carving (all small)</td>
<td>n.a.</td>
<td>17</td>
<td>135</td>
<td>81.0</td>
</tr>
</tbody>
</table>

Notes:
\(^a\) 'Centres' are general localities in which a particular industry is concentrated.
\(^b\) 'Units' are individual production enterprises.
\(^c\) According to the definition in footnote 'a' of Table 12.1
distinctive form of weaving, and even within a single kabupaten several different kinds can be found. Similarly, the considerable interest in NTT weaving from both within Indonesia and overseas springs from the fact that the many kinds suit a variety of tastes and preferences. In the development of the textile industry in NTT, the traditional ikat form of weaving using simple handlooms is being sustained, while ATBM weaving (Alat Tenun Bukan Mesin—non-mechanized weaving looms) is also emerging. Now there is also a commercial company which is active in the ATBM weaving industry, called PT Timor Agung Flobamor.

Small palm sugar industry. Centres making palm sugar are also widespread throughout NTT, but the largest concentrations are found in the following kabupaten: Kupang (Rote and Savu Islands), Ende, Manggarai and East Sumba (Figure 1.1). The number of lontar trees from which the sugar is derived is about 3,883,000 in NTT as a whole, but only 1,516,000 are presently being tapped for sugar. Until the end of 1988, the number of palm sugar (gula lontar/gula merah) centres was about 76, with a concentration of 5,780 units absorbing a labour force of 11,500 and with a production value for that year of Rp238,400,000 (Table 12.2). Efforts aimed at product diversification of palm sugar, which was initially only made in a liquid or slab form, have been applied to several centres which now produce sugar in the form of crystals, commonly known as gula semut.

The problems facing this industry are that the absorption of gula semut by the local market is limited. As well, the technology is still basic and the labour required for climbing the lontar trees is decreasing in many rural areas. The standard of quality between centres is also uneven.

Other industries. Details of the coconut oil, furniture, printing and publishing, salt, brick, cement products, essential oil, salted fish, coffee processing and carving industries are given in Table 12.2. It should be noted in relation to the coconut oil industry that the quality of the oil is low and cannot compete with imported frying oil; that the technological process is still very basic; and that most surplus coconuts are actually exported in the form of copra. In 1988 NTT exported 16,578,847 tonnes of copra.
It should further be mentioned that amongst the 83 printing and publishing units, the printing company PT Arnoldus Nusa Indah in *Kabupaten* Ende (Flores) is the most prominent, its product competing on both national and international markets.

**Problems**

The problems and obstacles faced by economic development in NTT in general, and by the industrial sector in particular, are as follows:

**Natural resources**

Apart from certain commodities derived from the agricultural and forestry sectors (livestock, tamarind, palm products, coconut, coffee, fish and wood), existing potentials for further processing are generally on a small scale and scattered, with the result that they are not economical.

**Infrastructures and support facilities**

1. The infrastructures of roads and harbours are, in general, still at the developing stage; this is also true of land, sea and air transportation equipment, which cannot fully support the carriage of goods and raw materials from centres of production to manufacturing sites and marketplaces. As a result of these conditions, transportation costs represent a major obstacle faced by entrepreneurs in industry, both in acquiring raw materials and in marketing products.

2. Spare parts must generally be brought into NTT from Java or other outside sources.

3. Repairs of certain machinery and equipment must be done in Surabaya.

**Entrepreneurship**

1. Entrepreneurship in NTT industry is very limited.

2. Generally, business people in NTT still function as petty traders, and assess their prospects of profits in the short term.

3. Native-born inhabitants of NTT who enter the world of trade and industry are virtually non-existent.
Low productivity of machinery/equipment
1. The technological processes used are still generally conventional or traditional.
2. Units do not operate on an economic scale, owing to the limited market.
3. Factories often operate far below capacity, because of the limited market or limited raw materials.

Capital
1. Capital accumulation is still limited, because of low income levels.
2. Entrepreneurs, especially in the industrial sector, are not yet able to use the bank credit facilities and other facilities to an optimal level.

Labour force
1. The relatively high wages (as well as the weak work ethos) and low level of skills of the workforce mean that costs of production are high.
2. Traditional working methods have not yet adjusted to the industrial culture, which means that productivity is low, costs of production are high, and the quality of products does not meet expectations.

Markets
1. The absorption power of the local market is limited, because of the small buying capacity of consumers.
2. Markets in NTT are scattered because of its geographical configuration, with the result that economic linkages between islands are weak.
3. The competitive advantage of manufactured commodities from NTT on inter-island markets is still low, due to high production and transportation costs and poor quality of production.
4. There is a traditional practice that almost all agricultural commodities exported to interisland markets from NTT are transported to Surabaya and Ujung Pandang. Conversely, NTT buys its manufactured goods from Surabaya and Ujung Pandang. It is hard to break this tradition.
Prospects

Industrial development opportunities in NTT are relatively limited, but there are several kinds of small- and medium- scale industry which can be developed in the region. These are summarized in Table 12.3, which includes some existing industries already treated in Table 12.2. There seem to be particular possibilities in tinning fish, in producing shark oil, in processing coffee and cocoa, and in weaving and other handicrafts.

This paper has addressed the present situation, problems, and future prospects of industry in NTT. There are certainly many difficulties facing development, but there are also good long-term potentials for improvement which are economically attractive, and which should be actively followed up.

Table 12.3: Industrial development potentials in NTT

<table>
<thead>
<tr>
<th>Shark (ikan hiu botol)</th>
<th>Chocolate/cocoa (coklat/kakao)</th>
<th>Brown sugar (gula merah) and crystal sugar (gula semut) from lontar palms</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Labour absorption: 50—175 people.</td>
<td>• Production: 1,000 tonnes (1987)</td>
<td>• Labour absorption: between 50,000 to 100,000 people.</td>
</tr>
<tr>
<td>• Potential locations: Northern and Southern Timor waters and Flores Sea, and the waters around Sumba.</td>
<td>• Possibilities for development: chocolate powder industry.</td>
<td>• Potential locations: Kabupaten Kupang and East Sumba.</td>
</tr>
<tr>
<td>Coffee (kopi)</td>
<td></td>
<td>• Obstacles: labour for tree-climbing and tapping is limited.</td>
</tr>
<tr>
<td>• Planted area: 37,257ha, especially in kabupaten Manggarai, West Sumba and East Flores.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Average production: 10,000 tonnes/year.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Exports: 4,700 tonnes/year.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Possibilities for development: powdered coffee industry (there is already one unit in Ruteng).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Obstacles: the quality of after-harvest processing of beans needs to be improved, as well as the technological process, capital, marketin, etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Chocolate/cocoa (coklat/kakao) | Brown sugar (gula merah) and crystal sugar (gula semut) from lontar palms | (continued next page)
Table 12.3 (continued)

Tamarind (asam)
• Potential area for planting: 1,700 ha; production of seedless tamarind: approx. 6,000 tonnes/year.
• Potential locations: Kabupaten Kupang, TTS, TTU, Alor, East Flores and Sikka.

Melaleuca oil (minyak kayu putih)
• The potential of this plant at present is limited; it is a plant that grows wild and is scattered in small clumps.
• It has potential throughout Kabupaten East Sumba, Kupang, TTU and Belu.
• Only two existing centres of small industry.

Bamboo (bambu)
• Potential locations: kabupaten. Ngada, Ende and Sikka.
• Planted area: Ngada, approx. 7,900 ha, consisting of the following types of bamboo: bambu betung, pering and bambu aur (1988).
• Possibilities for development: bamboo stick industry, canework industry, bamboo furniture, etc.

Eucalyptus Alb (Ampupu)
• Planted area 15,000 ha (1988).
• Potential locations: Timor, Alor and to a lesser extent, Flores.
• Possibilities for development: Eucalyptus oil refining.

Candlenut (kemiri)
• Planted area: 21,000 ha (1988).
• Average production: 4,000 tonnes/year.
• Possibilities for development: candlenut oil industry.

Salt (garam rakyat; garam industri)
• Potential area: approx. 12,215 ha.
• Pond area: approx. 20 ha.
• Production in NTT: approx. 2,500 tonnes (1988); demand is 9,000 tonnes/year, so the remainder is imported.
• Demand for salt for industry: approx. 500 tonnes/year.
• Potential locations: north coast of Timor, Flores and East Sumba.
• Obstacles: limited technology and access to capital for the construction of salt dams.

Dried/cured shredded meat (dendeng/abon)
• The raw material for this product (cattle) is plentiful.
• There were 599,832 cattle in NTT in 1987, with a growth rate of 2.49 per cent per year.
• Number of dried meat companies: 6 with a capacity of 40 tonnes of dendeng and 5 tonnes of abon per year.
• Obstacles: the basic technology, product quality, and packaging.
### Table 12.3 (continued)

<table>
<thead>
<tr>
<th>Molluscs (kerang-kerangan)</th>
<th>Handicrafts and souvenirs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The potential of molluscs has largely been left unexploited.</td>
<td>• Small-scale and cottage industry in NTT has considerable potential, especially in weaving, traditional foodstuffs and other handmade craftwork.</td>
</tr>
<tr>
<td>• Traded coral in 1987: 17,041kgs.</td>
<td>• Tourism in NTT is beginning to expand and needs souvenirs.</td>
</tr>
<tr>
<td>• Pearl shell from three pearl companies can be used to make handicrafts/souvenirs.</td>
<td>• Obstacles: shortage of capital for equipment, raw materials, operational costs (project aid only covers 2–3 years), and the problem of lack of skilled instructors.</td>
</tr>
<tr>
<td>• Possibilities for development: button and other shell handicraft industries.</td>
<td></td>
</tr>
</tbody>
</table>

#### Weaving (pertenunan)

• Represents a traditional art.
• Spread out in many centres (Table 12.2).
• The weavings are specific to the areas, and are varied in their designs and motifs.

#### Kapok and kapok seeds

• This plant grows all over NTT.

---

**Note:**

*a* See Figure 1.1 for locations of places mentioned.
THE ROLE OF TOURISM IN NTT DEVELOPMENT

Umbu Peku Djawang

The building up of tourism in Nusa Tenggara Timur can support regional development along with other sectors, and is fifth on the list of priorities in Repelita V (the fifth Five-Year Development Plan) for NTT (Gubernur Kepala Daerah Tingkat I, NTT 1988). This means that there is a challenge for the government and the whole community to discover and utilize the potential resources for tourism which are spread throughout the region.

However, these potential resources will be of no benefit to increasing the standard of living and the general wealth of inhabitants of NTT if their management is not supported by linkages with other strategic sectors, such as infrastructures including main roads, bridges, and airports.

Background

In successive Repelita for NTT, the agricultural sector has been the first priority in regional development. However, this sector has expanded relatively slowly because of poor soil fertility, the low level of agricultural technology, and the frequent occurrence of natural disasters as a result of a long dry season and low rainfall. Also, from an economic viewpoint, developing agricultural potentials scattered over various places and on a small scale increases economic costs.

As NTT is one of the poorest provinces in Indonesia, the government and the people have been challenged to look for new breakthroughs by exploring its possibilities and using natural resources that are not already being utilized effectively. One of these new possibilities is tourism development, and the regional government also has the political will to expand this sector as an integral part of regional improvement. It is hoped that, in this context, tourism will contribute to increasing the welfare of the people of NTT province.
Tourist needs

Tourism today is marked by an increasing number of people travelling between countries and across regions, for purposes of business or trade, meetings, recreation, sport, health purposes etc. To facilitate their travels, tourists need the following:

- basic infrastructures, such as roads, transport between countries or regions, harbours, electricity, water, and sanitation;
- supporting facilities, such as information, local transport, accommodation, food and refreshments, package tours, shopping and souvenirs.

These needs must be met by the various groups—that is, the government must build the basic infrastructures; the tourism industry must provide the supporting facilities; and the community must supply the other services, such as handicrafts and souvenirs. The community must also create the conditions conducive to tourism: security, order and a friendly atmosphere.

The participation of the various groups in meeting these needs will certainly be beneficial from the socio-economic, cultural and environmental points of view, for example by increasing the income of the region and its people, expanding business and employment opportunities, facilitating the rapid growth of new areas, and fostering a sense of unity and mutual understanding between countries and regions. Thus the management of tourism requires linkages and interdependency between the various sectors. This is in order to create positive conditions for a region targeted as a tourist area, to encourage the increase in flow of tourists and their length of stay, and to raise their amount of spending. The ultimate goal is to increase the standard of living and welfare of the local people, in accordance with the aims of regional development.

Tourism potential

The main elements contributing to tourism development in NTT are:

1. Its geographical location relatively close to Australia and to Denpasar (Bali).
2. Its tourist attractions, including natural assets, cultural assets, art and cultural traditions.

Australia, situated close to NTT, represents a potential tourist market. The opening up of Kupang (Bandara El Tari airport) as an
international gateway to NTT from Darwin is certain to give a boost to tourism in the region. With an integrated and effective programme of promotion in Australia, the flow of tourists should increase.

Likewise, NTT is located close to Denpasar, Bali, the main tourist destination in Indonesia—which, it is hoped, will become a launching point for tourists to NTT.

NTT is abundant in potential tourist attractions. Examples include the Komodo Dragon National Park, the Kelimutu ‘Three Colours’ Lake, the Maumere/Waiara Bay marine park, the pasola ceremony, the megalithic culture, especially of West Sumba, and the traditional kampung communities in various places.

Because of the scattered distribution of tourist attractions in NTT, and observing the principles of balance, appropriateness and compatibility while at the same time taking into account the key aspects of costs and benefits, the development of tourism in NTT must proceed in stages. This should be guided by the NTT Tourism Development Master Plan, which was established through Regional Regulation No. 12, 1986. The stages of development of tourism in NTT are summarized in Table 13.1.

Table 13.1: NTT Tourism Development Plan, 1986-2000*

<table>
<thead>
<tr>
<th>Tourism development area</th>
<th>Tourist centre(s) for each development Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Stage</strong>&lt;br&gt;(1986–1990)</td>
<td>West Flores&lt;br&gt;Central Flores&lt;br&gt;West Timor&lt;br&gt;Sumba</td>
</tr>
<tr>
<td><strong>Second Stage</strong>&lt;br&gt;(1990–1995)</td>
<td>West Flores&lt;br&gt;East Flores&lt;br&gt;Sumba</td>
</tr>
<tr>
<td><strong>Third Stage</strong>&lt;br&gt;(1995–2000)</td>
<td>West Flores&lt;br&gt;Rote and Savu&lt;br&gt;Alor</td>
</tr>
</tbody>
</table>

Note:
* For details of locations, see Figure 1.1.
The resorts involved include Pede Beach at Labuhan Bajo, Sanonggoang Lake and Nangalili Beach in West Flores; Detsuko-Moni, Wolotopo and Waiara Beach in Central Flores; Lasiana Beach and Batulesa (Kabupaten Kupang) in West Timor; Wanokaka Beach, Waikabubak, and Praigoli village in West Sumba; and Kutta Beach and Baing Beach in East Sumba.

The position of tourism in NTT

Tourist attractions

Tourist attractions are spread throughout the region. Nevertheless, the number of international visitors to NTT compared to other provinces is far smaller.

At several tourist sites some public facilities have already been built, for example at Lasiana Beach, Kupang; Pede Beach, Labuhan Bajo; and at Detsusoko-Moni in Kabupaten Ende. There is also the restored traditional house in Praigoli village in Kabupaten West Sumba.

Infrastructures and support structures

Almost every kabupaten capital has an airport. But South Central Timor and North Central Timor can only be served by Twin Otter/CN 235 aircraft, while the special airports at Maumere and Waingapu are served by F-27 aircraft. Kupang is served by F-28. There are several sea ports, including those at Kupang, Ende, Waingapu, Larantuka and Maumere.

Land transportation between kabupaten capitals on every island is generally good. But the transportation to and within tourist sites is still inadequate.

Tourism industry

Although NTT offers many tourist attractions, these must be supported by a tourism industry. Here both the formal and informal business sectors must provide and manage the needs to tourists. Tourist needs regarding basic infrastructures (roads, transport between regions, ports, electricity, water and sanitation) are the responsibility of the government, while the supporting structures (information services, local transport/tourist transport, accommodation, food and refreshments, shopping and souvenirs) should be supplied by the private sector.
The tourism industry in NTT as it stands at the moment is detailed in Table 13.2.

### Table 13.2: Tourist facilities and tourism training in NTT, 1989

**A. Tourist facilities**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Rooms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Hotels</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Starred</strong></td>
<td>One star—</td>
<td>2 in Kupang</td>
</tr>
<tr>
<td></td>
<td>Two stars—</td>
<td>1 in Maumere</td>
</tr>
<tr>
<td>Bunga Melati</td>
<td>Category Three—</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Category Two—</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Category One—</td>
<td>32</td>
</tr>
<tr>
<td><strong>2. Restaurants</strong></td>
<td></td>
<td>Seats</td>
</tr>
<tr>
<td></td>
<td>82</td>
<td>1,960</td>
</tr>
<tr>
<td><strong>3. Travel businesses</strong></td>
<td></td>
<td>No.</td>
</tr>
<tr>
<td></td>
<td>Public transport bureaus</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Branch offices of public transport bureaus</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Travel agents</td>
<td>2</td>
</tr>
<tr>
<td><strong>4. Entertainment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recreation parks</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Billiard houses</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Cinemas</td>
<td>13</td>
</tr>
<tr>
<td><strong>5. Trained Tourist Guides (persons trained)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1984–85</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>1986–87</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>1988–89</td>
<td>51</td>
</tr>
<tr>
<td><strong>6. Souvenir shops</strong></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td><strong>7. Tourist transport</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>As yet, nothing that fulfils the desired requirements.</td>
<td></td>
</tr>
</tbody>
</table>

(continued next page)
Table 13.2 (continued)

B. Tourism training

1. For tourist guides
   • to produce the guides detailed under (5) above

2. In-service courses (persons trained)

<table>
<thead>
<tr>
<th>Year</th>
<th>Hotel Management</th>
<th>Front Office Service</th>
<th>Food Service Management</th>
<th>Catering</th>
<th>Hotel Management</th>
<th>Catering</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>50 in</td>
<td>25 in</td>
<td>16 in</td>
<td>12 in</td>
<td>13 in</td>
<td>50 in</td>
</tr>
<tr>
<td></td>
<td>Hotel Management</td>
<td>Front Office Service</td>
<td>Food Service Management</td>
<td>Catering</td>
<td>Hotel Management</td>
<td>Catering</td>
</tr>
<tr>
<td>1986</td>
<td>50 in</td>
<td>25 in</td>
<td>16 in</td>
<td>12 in</td>
<td>13 in</td>
<td>50 in</td>
</tr>
<tr>
<td>1987</td>
<td>50 in</td>
<td>25 in</td>
<td>16 in</td>
<td>12 in</td>
<td>13 in</td>
<td>50 in</td>
</tr>
<tr>
<td>1989</td>
<td>50 in</td>
<td>25 in</td>
<td>16 in</td>
<td>12 in</td>
<td>13 in</td>
<td>50 in</td>
</tr>
</tbody>
</table>

3. Promotion of PHRI, and building up of taxi drivers in Kupang:
   30 persons

4. Promotion of tourist awareness amongst local population

<table>
<thead>
<tr>
<th>Year</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>80 persons in Labuhan Bajo and Lasiana</td>
</tr>
<tr>
<td>1985</td>
<td>80 persons in Moni and Waiare</td>
</tr>
<tr>
<td>1986</td>
<td>80 persons in Wanokaka and Prailiu</td>
</tr>
<tr>
<td>1987</td>
<td>120 persons in Djontona, Namodale, Kopeta, and Atambua</td>
</tr>
<tr>
<td>1989</td>
<td>Seman, Soe, and Kefamanunu</td>
</tr>
</tbody>
</table>

It should be noted that the level of occupancy in both the starred and Bunga Melati hotels is still relatively low, and that guests are more often from within the Indonesian archipelago than from abroad. In relation to tourism training, it should be stressed that the level of education and skill of the work force, both in the public service as well as in the tourism industry, is very important as it can improve the quality of services. Thus to raise the awareness of the general public and of prominent community figures regarding the importance of tourism and behaviour appropriate to supporting tourism, the government has even launched special training courses. This fostering of tourist awareness in the community is particularly directed towards community leaders and government officials who reside in areas surrounding potential tourist sites.
Tourism promotion

Tourism promotion is especially aimed at those countries which are potential tourist markets for NTT, such as Australia, Japan, the ASEAN member countries, the USA and Western Europe. Promotional material which has been used includes brochures, leaflets and tourist maps. Exhibitions have also been held in the region and in other Indonesian centres, including Jakarta.

Problems

1. The scattered location of tourist attractions/sites across several islands increases the costs of transportation, especially air transportation which is generally preferred by tourists. This is complicated by the small passenger capacity of aircraft.

2. The land transportation infrastructure from the kabupaten towns to the tourist sites is inadequate, as is the supply of electricity, drinking water and telephone services.

3. There is a lack of interest from investors in the management of those tourist sites which are in process of expansion or have been surveyed for development.

4. The quality of service in the hotel/accommodation, restaurant and tourist transport industries is not up to a desirable standard, because of low levels of education and expertise both at managerial and lower levels.

5. Travel bureaus which currently exist are not performing their function in an optimal manner.

6. Operational organizations and kabupaten tourism departments have not yet been established, which hinders the management and organization of the tourism sector in the regions.

7. Professional organizations and business associations in the tourism industry are not yet fulfilling their function properly.

8. NTT as a tourist resort is not well-known throughout the world.

9. The tourism potential in marine areas has not been developed.

10. Tourism awareness in the community is still weak.
Programmes

The implementation of tourism development during Repelita V for NTT province has been directed towards improving the infrastructure and tourist facilities, in the context of expanding employment as a prerequisite to increasing the incomes of local peoples.

With reference to the conditions, problems and challenges previously faced, the future tourism development programme will be carried out in the following spheres:

1. Development of tourist sites
   • Physical development at the location of targetted tourist sites.
   • Establishment of inventories of existing tourist sites, and the discovery of new sites.
   • Cooperation with PHPA (Kanwil Departemen Kehutanan Propinsi NTT or the Regional Coordinating Office of the Forestry Department) in expanding the tourism region.
   • Formation of the NTT Regional Commission of the Association of Recreation Parks (Putri = Perhimpunan Usaha Taman Rekreasi).
   • Creation of guidelines for the management of tourist sites.
   • Protection and maintenance of tourist sites.

2. Education and Training
   • Provision of skilled workers in the tourism field.
   • Improvement of the quality of service by managers in the tourism industry.
   • Fostering the level of awareness of community members and government officials.

3. Tourism facilities
   • Optimalization of the quality of management, operations and service in the tourism industry.
   • Inventories of and monitoring of tourist guides.
   • Efforts to ensure there are recreational activities and public entertainment enterprises organized in every kabupaten capital.
   • Efforts to ensure there are public transport bureaus and travel agencies set up in kabupaten capitals lacking these facilities, as well as souvenir shops.
4. **Tourism promotion**

- Participation in exhibitions (Kupang, Jakarta)
- Tourism awareness campaign:
  - seminars
  - education of local communities, particularly those close to tourist sites
  - lectures about tourism to junior and senior high school students
  - festivals of local traditional clothing, food, dance and songs in the *kabupaten* capitals.
- provision of tourism folders/leaflets
- provision of 16mm film projectors
- supply of calendars of events
- preparation and distribution of promotional materials.
- Compilation and monitoring of data on the visits of tourists to NTT.

5. **Research and development**

- Development of a plan for tourist sites in East Flores.
- Research into production of a detailed design and engineering plan for the tourist sites at Rua Beach, West Sumba.
- Preparation of plans for research and development of other tourist sites and attractions.
- Policy making regarding the pattern of tourism development, and discussions regarding the methods of implementing such development.
- Continuation of the upgrading of relationships with other institutions and organizations involved in tourism.
- Organization of the management of enterprises directed towards the development of tourist destination areas.

**Conclusion**

**Summary**

1. NTT has considerable tourism potential in its natural and human resources.
2. The scattered location of potential tourist sites over many areas, each possessing a locally specific tourist appeal, means that careful and thoughtful planning is required to obtain the optimum benefits.
3. Infrastructures such as roads, bridges and health facilities are at present inadequate to support tourism expansion.

**Recommendations**

1. Marketable package tours are needed.
2. The planning and implementation of infrastructures which support tourism should be coordinated.
3. Starred hotels should be constructed in potential tourist areas.
4. The quality of skilled workers in hotels, and in the tourism industry in general, should be improved.
Markets in TTS and TTU are little developed compared to those in parts of Indonesia with high population density. Each kabupaten centre, Soe for TTS and Kefamenanu for TTU (Figure 1.1), has a daily market, while all other markets are weekly. Almost all kecamatan centres have weekly markets, and there is one large weekly market at Maubesi, Insana, which occurs the day after the market at the kecamatan centre for Insana at Oelolok. Otherwise there are very few small village markets. Attempts to start small markets serving a few villages are being made in some areas, as at O'of in TTS. Although small informal markets sometimes emerge on Sundays after church in the predominantly Catholic TTU, such markets are unknown in Protestant TTS. Pigs, goats and dogs are sold in the fringes of the markets but cattle sales are organized on a different basis, albeit at the same settlements.

The survey

To find out what actually happens in markets, I undertook a survey of villagers who come to sell at the markets of Soe and Kefa and at selected weekly markets in both kabupaten. I recruited two assistants in each kabupaten to interview villagers who were selling in the various markets. No strict random sampling was possible, but a large proportion of the sellers present at the markets were approached. As long as villagers were not asked for their names, their refusal rate was very low,

---

1 This short chapter is primarily descriptive and represents some preliminary results of research undertaken in January and February, and later in June and July, 1989. The work in January and February was part of my research funded by the Faculties Research Fund, ANU. The work in June and July was part of research for a short-term consultancy associated with the NTIADP, and funded by AIDAB through the contracting company, ACIL Australia. The data refers exclusively to the two Kabupaten TTS and TTU. This chapter is a lightly revised version of a section of my consultancy report. More substantial publication is expected when further analysis has taken place.
about 1 per cent. All interviews were in Bahasa Dawan. In training the assistants I prompted in Bahasa Indonesia and conducted some interviews myself. The questions were few and simple: Where had they come from? How far? On foot or by bemo? If by bus or bemo, how much did the return journey cost? What were they selling? How much would they receive if they sold all they had at the price they were asking? Were they intending to buy anything? And how much would they spend? It was impossible to find out how much they actually sold and for what price, although I have that data for a few individuals. In all the following figure returns are optimistic maximums, and real returns are certainly lower.

The basic list of questions was covered with more than 600 villagers in each kabupaten. However, in certain cases other questions were asked, and a few long interviews were conducted on a variety of matters. In addition one assistant, who had worked for me before in January and February, conducted more comprehensive interviews with papalele. He covered over 300 Timorese papalele in all, but only from TTU. I interviewed—in some cases with assistance from Bangdes counterparts—large numbers of Bugis and Chinese traders of all levels, from small to very big. It was not possible to make any structured sample of buyers but I did a lot of talking to buyers who were not also sellers. Despite the inability to construct strictly random samples, I am confident that the results of these surveys are representative. The statistics presented are extracted from notebooks kept by me and my assistants. Much of the commentary is based on qualitative material from the same sources, which cannot appear in the tables.

**Description of markets**

Many villagers bring produce to sell at markets, where they squat on the ground, with a piece of plastic or mat in front of them, to display their wares. At the kabupaten centres and some smaller markets, such sellers must buy a karcis (ticket) for the right to sell for a day. These are sold by an official of the town administration (kopeta). In Kefa a karcis is Rp100; in Soe, Rp50. Some villagers manage to avoid paying for a karcis by either selling quickly and leaving early, or by hanging around outside the market until they judge the official has left. Larger dealers with stalls pay more and occupiers of kios within the market pay on a monthly basis. Villagers fill all the available space, crowding together and overflowing into surrounding streets, except at the very large new market at Soe.
Although many come and sell, the majority seem to sell only in order to buy. Such villagers take very little cash home, and transactions are on a very small scale. An outstanding feature of the marketing in both kabupaten is the distance some villagers come for an average cash return that is less than Rp2,500 in TTS and not much more in TTU. Details are given in Tables 14.1A and 14.1B.

The road systems of both kabupaten are being gradually improved, and it is possible for most villagers to reach markets by bemo or bus. However, because many are selling very little, they may not take advantage of any transport available. In my survey of market sellers, it was not uncommon for men to walk 40km or more there and back, although this was less common for women. The farthest recorded journey was a round-trip of 98km on foot.

The problem of transport is perhaps best illustrated by Soe market, to which 77 per cent of 254 sellers came by bus or bemo at an average cost of Rp534 (Table 14.1A). Their hoped-for maximum sales averaged Rp1,866, so that on average transport costs were 28 per cent of sales. Individual cases highlight the problem. Two ladies from Oelbubuk in Mollo Selatan paid Rp1,000 each for bemos for the return trip of 40km to Soe market. One hoped to sell sweet potato for Rp1,500, and buy pinang for Rp300, and the other hoped to sell a few citrus fruits for Rp1,750. A karcis to sell in the markets costs Rp50 at Soe, and if all went well, they would spend a day and return with Rp150 and a handful of betel nut in the first case, and Rp700 in the second.

There are sellers in the markets who use motor transport to come long distances with goods to sell in quantity. They keep their transport costs down to 10 per cent or less. Most such sellers come from outside the two kabupaten, although there are exceptions coming from favoured areas such as the south coast of TTS for pinang, or from the high areas for citrus. All large sales of produce seem to be collected by purchasers in the village. Markets are not used to accumulate bulk quantities but to disperse single person loads of produce.

Since a visit to the market will usually consume an entire day, it is obvious that the cash return and small purchases are not the only consideration. For most, a considerable social dimension is involved. Villagers at markets chat with each other and with Timorese small merchants, but their relationship with other dealers, mainly Bugis and Chinese, is more limited. Nevertheless they derive their information about prices and demand.
Table 14.1A: Details of sellers in TTS markets, June and July 1989 (Market Survey)

<table>
<thead>
<tr>
<th></th>
<th>Soe</th>
<th>Kapan</th>
<th>Oenlasi</th>
<th>Neonmat</th>
<th>Niki-niki</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>254</td>
<td>120</td>
<td>66</td>
<td>71</td>
<td>96</td>
<td>607</td>
</tr>
<tr>
<td>Avg. km to market</td>
<td>23</td>
<td>17</td>
<td>19</td>
<td>10</td>
<td>21</td>
<td>20</td>
</tr>
<tr>
<td>% travelling by bemo/bus</td>
<td>77</td>
<td>8</td>
<td>0</td>
<td>21</td>
<td>40</td>
<td>43</td>
</tr>
<tr>
<td>Avg. cost of bemo (Rp)</td>
<td>534</td>
<td>2,111</td>
<td>0</td>
<td>500</td>
<td>547</td>
<td>589</td>
</tr>
<tr>
<td>Avg. return (Rp)</td>
<td>1,866</td>
<td>2,465</td>
<td>1,777</td>
<td>1,830</td>
<td>2,146</td>
<td>2,015</td>
</tr>
<tr>
<td>% buying</td>
<td>72</td>
<td>66</td>
<td>73</td>
<td>56</td>
<td>68</td>
<td>70</td>
</tr>
</tbody>
</table>

Note:

*‘Return’ in these tables and elsewhere means the hoped-for maximum price for whatever the villager is trying to sell, less any costs of transport. The real take-home cash to the villagers will always be less, as no allowance has been made for other expenses such as the cost of a karcis. Nor has any allowance been made for any drop in price the villager may accept late in the day.

Table 14B: Details of sellers in TTU markets, June and July 1989 (Market Survey)

<table>
<thead>
<tr>
<th></th>
<th>Kefa</th>
<th>Eban</th>
<th>Oelo</th>
<th>Noem</th>
<th>Manu</th>
<th>Maub</th>
<th>Oeno</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>212</td>
<td>46</td>
<td>31</td>
<td>46</td>
<td>111</td>
<td>115</td>
<td>78</td>
<td>639</td>
</tr>
<tr>
<td>km to market</td>
<td>37</td>
<td>8</td>
<td>16</td>
<td>17</td>
<td>9</td>
<td>15</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>% travelling by bemo</td>
<td>59</td>
<td>17</td>
<td>39</td>
<td>13</td>
<td>1</td>
<td>29</td>
<td>17</td>
<td>31</td>
</tr>
<tr>
<td>Avg. cost of bemo (Rp)</td>
<td>1,297</td>
<td>475</td>
<td>458</td>
<td>517</td>
<td>1,000</td>
<td>630</td>
<td>808</td>
<td>1,040</td>
</tr>
<tr>
<td>Avg. return (Rp)</td>
<td>4,530</td>
<td>2,100</td>
<td>2,718</td>
<td>3,753</td>
<td>3,764</td>
<td>3,923</td>
<td>7,169</td>
<td>4,321</td>
</tr>
<tr>
<td>% buying</td>
<td>50</td>
<td>83</td>
<td>77</td>
<td>87</td>
<td>63</td>
<td>57</td>
<td>42</td>
<td>59</td>
</tr>
</tbody>
</table>

**Abbreviations:**
Oelo = Oelolok, Noem = Noemuti, Manu = Manufui, Maub = Maubesi, Oeno = Oenopu.
Papalele

Most villagers who come to market wish to sell their goods, make their intended purchases and return home the same day. It is often not possible to sell all they have brought by the time they should start for home, if they are to arrive before dark. In the daily market at Kefa (but not at Soe), villagers sometimes stay overnight in the market area, sleeping on the concrete platforms in front of the kios, so as to complete their sales the next day. The majority, however, sell their remaining produce to papalele at a reduced price. Papalele are small Timorese ‘wholesalers’ who buy in modest quantities for resale. They live full time off the markets, aiming to buy cheap and sell dear. They buy from villagers in the afternoons, or at smaller markets where prices are lower, and resell in the mornings at bigger markets. To some extent, they consolidate produce into larger quantities, but this is not for export from the local area. The scale of papalele operations is very small, and only about 10 per cent employ capital of more than Rp10,000. Despite their profits appearing large in percentage terms, the small absolute sums involved mean that many papalele are left with only a small margin above subsistence level, if any.

In terms of return, Table 14.2 once more shows maximum figures, and no allowance is made for the cost of transport or indeed of living. For villagers who act as occasional papalele, but can rely on accommodation and basic food from village residents, such returns are tolerable. For those who are full-time papalele and have to buy food and possibly accommodation as well, the minimum cost of living would be Rp1,000 a day. Yet the return figures given in Table 14.2 would take at least two days to earn. Some papalele are in fact barely viable.

As can be seen from Table 14.2, there are cases in which the returns exceed the capital. Again, the more than 55 per cent of papalele who get a percentage return (on capital) between 25 to 75 per cent average an absolute return of between Rp2,545 and Rp2,717, which is more or less adequate for survival. The overall trend is that as more capital is employed, less return is earned. But many of those in the group gaining the lowest return are full-time dealers in staple products, on which margins are very small but regular and reliable. Such goods are rice, on which 5 per cent can be made if sufficient capital is invested; and dried fish, salt, tobacco, and dried pinang kernel—all of which offer a fairly certain 10 per cent. These goods are bought from wholesalers, who
sometimes send agents themselves to kecamatan markets, effectively competing with the papalele. The higher returns are more entrepreneurial in character.

Table 14.2: Papalele operations, TTU only, capital employed and average return, sorted by percentage return

<table>
<thead>
<tr>
<th>Percentage return</th>
<th>No.</th>
<th>Average capital (rupiah)</th>
<th>Average return* (rupiah)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;25</td>
<td>84</td>
<td>9,643</td>
<td>1,327</td>
</tr>
<tr>
<td>25&lt;50</td>
<td>103</td>
<td>8,671</td>
<td>2,717</td>
</tr>
<tr>
<td>50&lt;75</td>
<td>63</td>
<td>4,582</td>
<td>2,609</td>
</tr>
<tr>
<td>75&lt;100</td>
<td>10</td>
<td>3,130</td>
<td>2,545</td>
</tr>
<tr>
<td>=&gt;100</td>
<td>51</td>
<td>3,185</td>
<td>4,551</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>311</strong></td>
<td><strong>7,027</strong></td>
<td><strong>2,615</strong></td>
</tr>
</tbody>
</table>

Note:

*a The 'return' to papalele = income from sales less costs of purchases.

The highest return in the sample of 311 papalele was Rp38,500 on a capital of Rp11,500. This was for a load of 64kg of fresh pinang bought in Flores, which took more than eight days to realize. Transport and living costs cut the real percentage return to 100–150 per cent. Most of the high returns are made on fresh fruit and vegetables bought by papalele and and moved to bigger markets or stored for a day or so.

Tobacco traders are really a sort of papalele, in that they buy in bulk and are always in the market. Tobacco sellers occupy a distinct area of the market and sell cured cut leaf, of Javanese origin, in paper rolls of Rp100 or Rp200 in price. Most are young Timorese, and are professionals. Being close together allows them to monitor each other’s sales and the quantity offered. I gather that the mark-up on tobacco is substantial, but the traders were not forthcoming with reliable information in this respect. In Kefa most of the tobacco traders also dealt in silver, both coins and jewelry. I do not think that tobacco sellers in Soe market played such a role, as silver is sold to shops. In some cases traders owned coins and jewelry worth ten or even one hundred times their stock of
tobacco. The items included both silver bracelets and the coral necklaces that are important in bridewealth transactions. However, the traders relied on tobacco sales for daily income. Quantities of silver can be large, and one Bugis tobacco seller in Kefa produced over 25kg of silver coinage when he thought I might be interested in buying. Coins and jewelry are bought by the Timorese if they have the funds, but the majority are transferred to Kupang, and onwards to Bali and Jakarta.

**Larger traders**

While the *papalele* are permanent or semi-permanent inhabitants of the kabupaten markets, the permanent traders are all Bugis or Chinese. It is they who control all manufactured and imported goods. They buy vegetables from villagers for their personal needs, but there is little consolidation of local produce into large lots for sale or export elsewhere. Bugis traders have *kios* around the outside of the areas used by villagers to squat and sell. They sell clothes, cigarettes, pots and pans, plastic wares, simple steel tools and other manufactured goods. Other Bugis, and some Rotinese, sell from large stalls in the general selling area. These stalls mainly retail imported food, dried fish, mung beans, dried sliced betelnut (*pinang iris*), tobacco, onions (*bawang merah*), small packets of biscuits, and so on. They also sell soap and a range of medicinal and toilet items.

Chinese mainly occupy shops outside the main market area, but supply goods to small retailers in the market. Entrepreneurs also finance the street sale of meat from kabupaten slaughter houses, and fresh fish imported by bus from Kupang. In Kefa there is one large Chinese firm, which has a reputation for fair trading, that sells rice and other staples by weight directly in the market. The same firm also stocks a large range of items that are bought by village-based *kios* owners, both private and KUD, for resale. In fact it supplies virtually all the small retail outlets throughout TTU. It conducts a very large business from a cramped base in the market where its shop/stall is the scene of continuous activity from morning to night and is by far the busiest commercial site in TTU. In one randomly selected half-hour period, I saw it sell over 250kg of rice alone, while neighbouring sellers sold perhaps 10kg each; this was despite the same prices.

There are Chinese and/or Bugis-owned shops at most kecamatan centres. Where there are only weekly markets, these tend to be general stores with small stocks of a wide range of produce. There are also
Timorese-operated kios in some villages, mainly owned by a local KUD or the PKK. These have very small stocks of a very limited range of items, and turnovers that can only be described as minute. Prices at such locations are always higher than at the kabupaten centres. In the kecamatan markets, locally produced vegetables tend to be lower in price than in the centres, while manufactured goods and imported foods are higher in price.

In most villages there is direct selling to consumers, and the markets function to supply food to town dwellers and others in full-time employment who must buy their food. This population is limited and will only grow with the increase in governmental servants and a general improvement in the local economy. It thus appears that the prospect is for slow growth. Some producers with large quantities of produce that can be kept for at least a few days come to the market outskirts, sell quickly to papalele, and return home at once. All papalele are agents in a sense, but they are acting for their own profit and must buy at less than the market price to make a living. Otherwise there is little use for intermediaries between producers and consumers in the actual markets.

**The use of markets in TTS and TTU**

Tables 14.1A and 14.1B give a crude outline of the use by villagers of the markets studied. Many people believe that TTS is more economically advanced than TTU, yet average returns are less than half those in TTS. It is also clear that the markets at kabupaten centres, Soe and Kefa, attract more long distance sellers who use bemos more frequently. This difference is not quite so marked at Soe.

Some of the kecamatan markets such as Oenlasi, TTS, and Manufui, TTU have a decidedly local character as almost everyone walks. Oenlasi has the lowest average figure for sales in TTS yet at the same time it has the highest percentage of people buying. This exemplifies the trend of villagers going to market to buy, and selling only to cover their expenses.

A more detailed comparison between Soe and Kefa (Table 14.3) breaks down the sellers by expected return. This highlights the difference at the lower end of the scale, where Soe has a large number of sellers who expect a return of less than Rp1,000 but who nevertheless ride on bemos. At the higher end the figures look more similar, although Kefa sellers come much further. Soe sellers all buy to much the same extent, but in Kefa the more you get, the less likely you are to spend any of it.
All those in Kefa who expect less than Rp1,000 for their produce intend to buy, but only 32 per cent of those who expect more than Rp5,000 intend to buy. The cost of bemos is apparently higher in Kefa, while the distances are less, except for sellers with the highest return.

### Table 14.3: Kefa and Soe markets stratified by villagers’ expected return

<table>
<thead>
<tr>
<th>Return (Rp)</th>
<th>Number</th>
<th>Avg. km to market</th>
<th>% by bemo</th>
<th>Avg. cost (Rp)</th>
<th>Avg. return (Rp)</th>
<th>% buying</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kefa</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1,000</td>
<td>10</td>
<td>28</td>
<td>40</td>
<td>1,125</td>
<td>655</td>
<td>100</td>
</tr>
<tr>
<td>&lt;1,000</td>
<td>111</td>
<td>17</td>
<td>73</td>
<td>417</td>
<td>526</td>
<td>77</td>
</tr>
<tr>
<td>1,000–2,500</td>
<td>51</td>
<td>18</td>
<td>41</td>
<td>548</td>
<td>1,810</td>
<td>73</td>
</tr>
<tr>
<td>1,000–2,500</td>
<td>81</td>
<td>22</td>
<td>81</td>
<td>501</td>
<td>1,427</td>
<td>69</td>
</tr>
<tr>
<td>2,500–5,000</td>
<td>75</td>
<td>32</td>
<td>48</td>
<td>1,069</td>
<td>3,507</td>
<td>47</td>
</tr>
<tr>
<td>2,500–5,000</td>
<td>41</td>
<td>41</td>
<td>76</td>
<td>911</td>
<td>3,367</td>
<td>63</td>
</tr>
<tr>
<td>&gt;5,000</td>
<td>76</td>
<td>57</td>
<td>86</td>
<td>1,417</td>
<td>7,876</td>
<td>32</td>
</tr>
<tr>
<td>&gt;5,000</td>
<td>19</td>
<td>27</td>
<td>84</td>
<td>516</td>
<td>8,595</td>
<td>74</td>
</tr>
</tbody>
</table>

It is clear that in all the markets studied, there is a majority of villagers who bring only a small quantity of goods to sell, and who intend to buy on a similarly small scale. Indeed it seems likely that their motives in coming to the market are to buy, and to get social experience. They bring products to sell only to cover their expenses.

In each of the larger markets, however, there is a group of sellers which is interested only in selling and expects a larger return. These villagers do not buy, and take home most of the cash earned. This group is probably underrepresented in the samples, since some villagers come in by transport and sell ‘bulk supplies’ to *papalele* at the market fringe, returning home instantly and therefore not getting into the market.
sample. 'Bulk' is used only in a comparative sense here. Interviews with such men on the market fringes reveal that their sales are in the Rp10,000–15,000 range, while their transport expenses are up to Rp2,000. Of course, they do not pay for a karcis or have other expenses. Most of these men are selling traditional goods such as sirih catkins or pinang nut. There is a trend apparent in the figures that all those who do not intend to buy bring more produce than those who do buy, thus confirming the view that the majority of market sellers are there primarily to buy. Villagers who only sell are behaving in a way closer to 'economic man', as are the papalele, but are very much in the minority.

**Purchases**

Most villagers are happy to spend the day at the market, enjoy the social scene, talk with other villagers and return home with a small purchase and very little cash. The small purchases are overwhelmingly 'traditional', with the up-to-date additions of kerosene, MSG and, in the season, exercise books (buku putih) for the new school year (Table 14.4). Salt is bought everywhere, but the demand seems especially high in TTS; kerosene is bought everywhere, but MSG more in TTU, and Sirih (betel pepper leaves or catkins) and pinang (betel nut) are again more sought in TTU.

**Table 14.4: Principal purchases of sellers at four kecamatan markets. Percentages of most frequently purchased goods (minor purchases not recorded)**

<table>
<thead>
<tr>
<th></th>
<th>Salt</th>
<th>Kero</th>
<th>MSG</th>
<th>Sirih/ Pinang</th>
<th>Buku putih</th>
<th>% of all purchases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eban, TTU</td>
<td>13</td>
<td>18</td>
<td>24</td>
<td>26</td>
<td>5</td>
<td>81</td>
</tr>
<tr>
<td>Manafui, TTU</td>
<td>6</td>
<td>31</td>
<td>9</td>
<td>23</td>
<td>11</td>
<td>80</td>
</tr>
<tr>
<td>Kapan, TTS</td>
<td>19</td>
<td>39</td>
<td>–</td>
<td>11</td>
<td>8</td>
<td>77</td>
</tr>
<tr>
<td>Oenlasi, TTS</td>
<td>48</td>
<td>37</td>
<td>–</td>
<td>–</td>
<td>8</td>
<td>93</td>
</tr>
</tbody>
</table>
Prices

Information about market prices and shortages seems fairly good in most villages. There are clear expectations about what the price for any item will be, and that price is fairly standard across sellers from different villages when the market starts. After two or three hours in the smaller markets, the price tends to fall. As the market winds down, sellers must decide whether to sell to *paralele* or take the unsold surplus home. The problems for villagers are then selling early while the price is up, and judging the quantity that can be sold at that market that day. For the *papalele*, quality is of some importance; while all villagers seem hopefully to bring more than they are able to sell at top price. The daily *kabupaten* markets are preferred in many ways since they last all day, and sellers in Kefa can even stay overnight and try again the next day.

Villagers seem well aware of what can be sold in markets. They also know that prices vary during different times of the year, yet they do not seem to feel themselves able to take advantage of these differences. They all seem to plant the same things at the same time, thus keeping the price down when they harvest. In the matter of garlic, which has a substantial seasonal price variation, villagers repeatedly told me that they started off by storing it. Before the really high prices came, however, there was some cash crisis in the household and they sold the garlic. In the highest parts of TTS, where garlic growing has a longer history and storage is more common, some growers release stocks gradually to take advantage of price movements, but their efforts are small in comparison to the traders who buy in large quantity at harvest. It is these big traders, some of them *pegawai*, who effectively control the garlic price and make the profit from the price rise. This effect from a subsequent price rise seems more generally marked in TTS than in TTU (see Figure 14.1).

Products that are available all year round, such as tomatoes, rise in price towards the end of the dry season; but there is in again in this case a substantial disparity between prices at small markets in the higher country and at central markets. Tomatoes are particularly the subject of *papalele* activities, they buy up in small quantities and keep a stock at the major markets. *Papalele* in this case tend to keep prices high at Kefa, but not at Soe where there is a better supply from nearby villages (Figure 14.2). In Kefa *papalele* will buy the few tomatoes villagers bring in, at
Figure 14.1: Garlic prices, TTU and TTS 1988/89

Rp '000/kg

June July Aug Sept Oct Nov Dec Jan Feb March

Kefa(TTU) Noemuti(TTU) Soe(TTS) Niki2(TTS)

Figure 14.2: Tomato prices, TTU and TTS 1988/89

Rp /kg *

June July Aug Sept Oct Nov Dec Jan Feb March

Kefa(TTU) Noemuti(TTU) Soe(TTS) Niki2(TTS)

*from Supandhi, 1989; Witedarmu, 1988; Dinas Pertanian, 1989.
a price comparable to that in the kecamatan markets. They then sell at the higher Kefa price. In a comparison of tomato prices, Kefa prices are consistently above those of Noemuti, taken as a kecamatan market in the same kabupaten of TTU for comparison. At the lowest the difference is a third more, but at the height of the dry season, the Kefa price is more than double that of Noemuti. Comparable figures for Soe and Nikiniki in TTS show that dry-season prices at Soe actually drop below those at Nikiniki (Figure 14.2). The example of tomatoes is treated at some length, because it is the only case I have been able to find where the papalele have an effect on the market price, rather than just riding on the margins. Kefa town dwellers actually pay more for tomatoes because the papalele have succeeded in establishing a near monopoly situation in that market. There are some similar features present, but not to such a marked extent, in the trade in chillies, which the papalele tend to dominate at both Soe and Kefa.

The actual sums of cash required at markets are constant. What varies are the quantities. In other words, when buying chillies, one pays Rp100 or Rp200, and gets more or less, depending on the ruling price. This type of pricing mechanism is best seen in Kupang fish market, where there are only two prices, Rp500 and Rp1,000. Small fish are sold in piles, to one or other of these prices; big fish are cut and sold at the same price levels. It is possible to buy a whole large fish but the price is set through negotiation and is usually more expensive than when it is cut.

Conclusion

Markets serve principally as centres for the distribution of manufactured and imported goods to villagers. They also supply the food needs of pegawai and other town dwellers. Markets do not function to collect bulk village production. All agricultural surplus is bought in the village by traders who collect it. It is probable that if villagers sold any surplus produce in the markets, they would get a better price, especially if they stored produce such as garlic. However, if the villagers had to bear the cost of transporting bulk crops, this would cancel any price advantage. In theory KUD could collect produce and return the best price to villagers, but they do not do so. In general, KUD in the kabupaten pay low to very low prices, and do not distribute any profits to their members.
DEVELOPMENT PROGRAMMES: PLANNING APPROACHES AND IMPLEMENTATION
THE IMPLEMENTATION OF REGIONAL DEVELOPMENT PROGRAMMES (PPW) IN NTT

Piet Djemarut

Introduction

The emphasis of development in NTT, as officially set out in the basic framework of regional development for Repelita V in the province (Gubernur Kepala Daerah Tingkat I NTT 1988), can be summarized as follows:

1. To increase the standard of living, education and welfare of the entire population to become a more equal and just society.

2. To lay the foundation for subsequent stages of development, through consolidating interregional compatibility, giving impetus to rural regional development, and improving the quality of development resources.

An evaluation of the results of development during Repelita IV in NTT indicates that the standard of living and welfare of the rural population was still very low. This is reflected in the low RGDP per capita of farmers, which was only 26 per cent of the national average. (In 1987 the population of NTT averaged Rp251,728 per capita per year, while NTT farmers averaged Rp151,711 and the national mean was Rp576,739.) Moreover, the agricultural labour force represents 84 per cent of the total work force in NTT, and has a very low productivity.

This situation will certainly be a major constraint in the preparations for take-off during Repelita VI and thereafter, which means that there needs to be some serious thinking about, and conceptual solutions for, the issue of development of the rural population of NTT. There needs to be a style of approach to development activities that accelerates the development process.
On the one hand, it is difficult to create a plan that is comprehensive and homogeneous, because communities are made up of diverse ethnic groupings, motivations and abilities. On the other hand, the factors of differing natural resources and the uneven level of regional assets development frustrate the provision of development services through sectoral channels. Consequently, the rural poor are trapped in pockets of poverty, which are underserved and underreached.

There needs to be a breakthrough by evolving development packages which are suited to local conditions. However, this requires relatively large amounts of funding and specialized attention, due both to the size of the problems and to the extent of activities that need to be undertaken. Funding on a relatively large scale will be difficult to meet solely with domestic development funds.

Funding regional development programmes (Program Pembangunan Wilayah [PPW]) with foreign aid meets such funding needs, so that domestic funds can be used only as supplemental funds, including sectoral, regional and Inpres funds. It is more efficient and effective to use foreign funds to reduce imbalances between sectors, because, amongst other things, it is not certain that the results will directly and immediately answer the needs of the local community. When such needs appear, they can then be met by local funds.

Another aspect to consider is that if PPW can be well-planned, the role of government can then be limited to the role of stimulating and motivating development, with the people developing according to their needs and abilities, as encouraged by Repelita. In this way, government development funding can be reduced.

Through PPW with specific activities, locations and target groups, the participation of the community can be fostered, especially while the chances of securing aid are high. In this way the continuity of the activities can be assured.

This outcome will be possible if the social groups which are PPW recipients can get activities appropriate to their needs through trial projects. Such a programme will be strengthened if, during the period of project aid, the people are supported in developing financial institutional abilities which in the future can be expanded further by the use of rolling funds. Progress will also be encouraged if a part of a community group which is a project recipient can be directed towards specialization, for example, as nursery farmers or as manufacturers of livestock food.
The development of community participation in the context of NTT already has as its basis the *Lembaga Swadaya Masyarakat* (LSM)—the non-government organizations (NGOs). Those which have been developed by religious missions are already numerous and widespread throughout the *kabupaten* of NTT. The pattern of LSM participation in development, as far as it is coordinated together with the government, can have a significant role.

Several types of PPW have already been implemented, and those which are still in operation continue to gain experience and have various impacts, although not all outcomes have reached their optimal benefit. The following analysis attempts to analyse the experiences of PPW.

**Underlying concepts and objectives of PPW**

On a national level, PPW programmes were essentially conceived in the hope of correcting imbalances in the rate of economic growth and distribution of wealth between regions as well as social groups.

This goal has not yet been achieved, partly because of the emphasis in development on the principle of economic growth implemented through sectoral channels, which was prevalent during and preceding Repelita I. However, it is clear that the model of regional development with a sectoral approach alone cannot solve regional problems in a comprehensive way. Because decisions tend to be based on the fulfilment of targets or basic economic criteria which are standardized and generalized, other important aspects and essential dimensions to development features, such as the aspect of layout and dimension of a region, as well as its socio-cultural features, are not taken into account.

Various measures have been put into effect to correct imbalances. These include institutional expansion at the central and regional levels with the formation of the regional departments in *Bappenas* (*Keppres* No.15/74 concerning *Bappeda Tingkat I*), the implementation of projects in a decentralized way by departments, and *Inpres* programmes. But imbalances are still noticeable as a result of the high degree of heterogeneity within as well as between regions.

The first regional development programme (PPW) in NTT which obtained the support of foreign aid was called the Provincial Area Development Project (PDP), which was created in cooperation with USAID. Since then, and especially since Repelita II which emphasized the equitable distribution of development and the introduction of the
concept of regions, many other donor countries have given aid, although there are differences between their programmes and approaches.

These regional development programmes focus attention on the development of a model of decentralization based on the principle of planning from the bottom, with the primary aim of raising the standard of living and income of the poor, especially in isolated, poor and underdeveloped regions. This represents a regional and target group approach.

Because, in its implementation, a PPW covers many activities which in turn involve many sectors, it is multi-sectoral in character and has multiple sources of funding. It accordingly represents the basic approach for integrated regional development.

In NTT, the results of an evaluation at the end of Repelita II showed that approximately 60 per cent of the total number of kecamatan were poor. Of these poor kecamatan, some were concentrated within kabupaten, while others were isolated and surrounded by areas which were not poor by comparison, thus representing pockets of poverty in the region.

To overcome this problem, the regional government has chosen the development strategy of weak and strong points. In the sense that the pattern of development should be adapted to the regional situation and conditions, the regions which are relatively advanced are 'pushed' so that they can give a spread effect to the surrounding regions, while the regions which are still very underdeveloped are 'pushed and pulled' so that they can develop with surrounding regions as quickly as possible.

However, for the weakest regions, the types of development activities required are often extremely specific, which means that it is very difficult to create a comprehensive programme. Large amounts of funding are also required. On this basis, these regions are recommended to obtain foreign aid through PPW.

**The regional development programme in NTT**

*Types of PPW in NTT*

The following PPW activities have been carried out in NTT:

*PDP II (Provincial Area Development Project).* This operated from 1983/84 to 1987/88 through USAID. In the beginning it only covered the kabupaten TTU, Belu and Alor, but then it was extended to kabupaten
Djemarut: *Implementation of PPW in NTT*

TTS and East Flores (Figure 1.1). USAID support ended in 1987/88, and presently activities are continuing through APBD I and APBD II funding in each *kabupaten*.

Total project funding up to the end of PDP II was Rp3,941 billion to finance 175 projects, with a ratio of Indonesian government to USAID funding of 30:70. Besides its loan, USAID also gave technical aid in the form of long-term and short-term consultants, domestic and ASEAN comparative studies, and Masters programmes in the United States. The project covered a total of 101 villages, involving 14,439 families as the target group.

*NTASP (Nusa Tenggara Agricultural Support Project).* This began in 1986/87 and runs to 1990/91, being supported by IBRD aid. It covers six *kabupaten* (TTS, TTU, Belu, Sikka, Manggarai and West Sumba), and is broken up into several project activities. The funding through sectoral channels is aimed at:

- Agricultural development research
- Cotton development
- Livestock development
- Increasing roads in Flores

whilst the funding through regional channels comprises:

- Development of agricultural services
- Lembor Integrated Area Development.

NTASP in NTT represents a part of the total NTASP, which also covers the province of Nusa Tenggara Barat (West Nusa Tenggara [NTB]).

Total project funds for NTASP in the two provinces amount to US$59 million, including technical aid of US$6.8 million and a loan of US$33 million. Matching Indonesian government funds are US$19.2 million.

The funding through regional channels covers twenty-six *kecamatan* for agricultural services development, while *kecamatan* Lembor represents an integrated development area.

*NTTIADP (NTT Integrated Area Development Project).* This began in 1986/87 and runs to 1991/92, being supported by AIDAB aid.

It represents the extension of an earlier project, the Livestock Development Project in Besi Pae (*Kabupaten* TTS), which was
enlarged to cover other areas in Kabupaten TTS and TTU. The Livestock Development Project only covered the development of water reservoirs for livestock and people, and the improvement of grazing fields in Besi Pae (4,000ha) for five years (1989/81–1985/86). Under the NTTIADP the project was expanded to include regional development, but the core was still the development of reservoirs, to be accompanied by the expansion of agricultural production, livestock, local roads, rural drinking water, greening activities and agricultural research.

Total project funds for the NTTIADP amount to A$23.6 million for technical aid and equipment. Matching RI aid is Rp9,337 million.

The project covers fifteen kecamatan, consisting of 75 villages.

General. The aims of the various PPW activities, as set out in each MOU or loan agreement, can be classified according to the following five primary objectives:

1. Increasing the incomes of farmers.
2. Increasing the abilities and skills of the implementing agencies and the farmers.
3. Increasing and developing the agricultural extension services, supporting institutions and social institutions.
4. Decentralizing development planning, and promoting a balance in development between regions.
5. Developing a database for planning purposes.

Planning and coordination mechanism

Before a project is implemented, it is preceded by a study in the form of an inventory of potential resources, problems, and socio-economic conditions. Then the scope of activities and sectors involved are formulated.

There is no detailed project design with annual targets, region-related activities, interregional links, or preparation of project management staff. The project directly enters the implementation phase through the annual formulation of activities, which are set down in the DIPDA (List of Area Projects) connected to the annual budget concerned.

In other words, in PDP II and NTTIADP, the regional aspects of the activities are not so defined, while NTASP in the Lembor plains has a
more defined area. But it still does not involve specific planning for raising the economy of the community.

Coordination of PPW project implementation lies with Bappeda Tingkat I and Bappeda Tingkat II of the selected kabupaten, and project implementors are the related agencies and institutions. In Bappeda Tingkat I/II, a Project Management Unit (PMU) has been formed which involves all departments in Bappeda, but is limited to particular personnel to avoid fusing the project activities with everyday functional duties in those departments.

Parallel with the PMU, there is the Project Implementation Unit (PIU) at the agency or institution level. In fact, the donors of these programmes request this kind of management, as well as full-time staff to carry it out.

For the coordination requirements mentioned above, an organizational structure has been formed which has varied from programme to programme. Every year the decrees of the governor, as well as the announcements of the bupati and the head of the agency/institute carrying out the project, have given details of the personnel involved.

Programme activities and results

Various components have been developed within the framework of realizing the objectives of the different PPW, and covering the following activities:

1. Development of technology and patterns of cultivation:
   - Integrated farming activities using conservation methods
   - Livestock distribution/raising penned livestock
   - Introduction of prime seeds
   - Fruit tree cultivation
   - Fish farming
   - Agricultural research

2. Development of agricultural service/support institutions:
   - Seeds for food crops/estate agriculture
   - Animal health clinics
   - Livestock abattoirs
   - High-yielding material seedling gardens
   - Workshops for production of agricultural equipment
3. Development of infrastructures for agricultural support and rural drinking water:
   • Building of reservoirs
   • Capturing of springs and shallow wells
   • Piping for rural drinking water

4. Increasing the abilities of official apparatus and farmers' skills:
   • Education/training of Dinas and Bappeda technical staff
   • Training in ploughing, water use, use of agricultural equipment/machinery
   • Development of nursery farmers
   • Comparative studies with other areas

5. Development of the rural local economy:
   • Expansion of the handicraft industry
   • Salt production
   • Informal credit arrangements
   • Cooperatives/LUB

6. Expansion of village/area infrastructures and settlements:
   • Rural roads
   • North Flores trans-highway
   • Village offices (for local officials)
   • Preparation of land lots for settlements

7. Improvement of community health and nutrition:
   • Malaria prevention and provision of basic health services
   • Increasing nutritional food sources from farming enterprises

Impacts

Although the results so far achieved have not reached their optimal level because some programmes are still being implemented, there have been considerable impacts already.

1. Impacts on the development of institutions and human resources:
   • Improvement of official apparatus abilities in the administrative/development management field.
   • Improvement and development of agricultural service/support institutions
   • Improvement of local farmers' skills.

2. Impacts on the expansion of agricultural production:
• Improvements of soil quality and production technology.
• Improvement in the use of production facilities.
• Improvements in production and productivity.

3. Impacts on welfare:
• Improvements of rural drinking water supplies.
• Increases in income from farming enterprises.
• Increases in community health services.

Problems

During the course of implementation of PPW from various foreign aid sources (PDP II, NT ASP, NTTIADP), many obstacles have been met in technical, socio-cultural, funding, and reporting aspects, and these have been caused by weaknesses in various areas. The major problems common to these PPW activities can be grouped in terms of planning and coordination, monitoring and reporting, abilities of the implementing apparatus, delays in bureaucratic procedures, and lack of base-line data and information.

Problems of planning and coordination. There is no detailed plan before the implementation stage of each of the activities. This is a plan which could act as a programme for implementing the PPW package, and which is particularly related to each location site as well as to the potentials and needs of each site. Because such a plan is not made, the target to be achieved at each location site or subdistrict is not clear.

Again, the management staffing needs (both administrative and technical) of each implementing agency/institute are not prepared before the implementation stage. As a result, the project implementors do not have a clear picture of the roles and functions to be carried out.

Further, because of the deficiencies in management and staffing, there are difficulties in coordination at the implementation stage, so that the results of the activities do not accurately meet the needs of the target group concerned.

A common coordination problem is that, although in the implementation of activities there is an organization structure both at the provincial and the kabupaten level, it does not function completely. This is brought about because both the PMU and PIU organization structures, as explained previously, do not directly support the functions of the department/service or agency/institution involved.
Problems of monitoring and reporting. There has not yet been developed a system of monitoring that guarantees a flow of reporting which is informative or reflective according to the phase of activity in the field. The only guide used is Inmendagri (Interior Minister’s Instruction) No.12/1985, which in fact is inadequate for activities such as PPW. As a result, the solution of problems in the field and anticipation of the changes in planned activities have not been overcome quickly, and have later become cumulatively larger problems.

The problem of the abilities of the implementing apparatus. The problem of ability is viewed here from an overall perspective, where the end-result in terms of quality and zeal in implementation is assessed. Some difficulties in this respect have already been explained.

The problem of delays in bureaucratic procedures. This problem originated with the mechanism of compiling LK, because project managers (Pimpro) are spread across various institutions and kabupaten. As a result, the publication of Lists of District Projects (DIPDA) has been delayed.

Again, the mechanism for release of loan funding, which must be submitted by each project manager to the Directorate General of Budgets in the Finance Department, has not worked well and is felt to severely delay the channelling and distribution of funds.

Problems of baseline data and information. The lack of baseline data and information from the site of the project activity is keenly felt at the implementation stage, and affects the integration of activities in the field. This lack arises because there is no preparation phase or production of project design, as explained earlier.

Conclusions and recommendations

Conclusions

The three kinds of PPW implemented in NTT (PDP II, NTASP, and NTTIADP) are all aimed at development of the region. However, in reality, because the limits of the ‘region’ are unclear, the project activities tend to be characterized by a package of sectoral activities aimed directly at a target group, where the location is usually a desa (village). The exception has been the Lembor Area Integrated Development Project, which has a clearly defined area/region, i.e. SKP Lembor.

There is no detailed project design before implementation, which causes difficulties in justifying proposals for annual activities from the
government agency/institution carrying out the projects. It also discour­ages the integration of field activities between projects. There is a lack of staff, both administrative and technical, at the implementation stage, because no provision is made for this beforehand. Again, staff training, which is subsequently organized while project activities are in progress, is only in the form of practical instruction designed to upgrade specific skills.

The coordination of planning and implementation as well as reporting does not proceed smoothly because there are no detailed design, monitoring and reporting instruments. Furthermore, because the organization implementing the project is an ad hoc body within the agency/institution carrying out the project, coordination with other activities outside the PPW in the same region lacks direction. This applies to supporting activities with funding from outside the PPW.

Project activity packages, especially those which are directly aimed at a target group or farming community, are only for one year in specific terms, and extended for one or two subsequent years only in the form of fostering by a technical government agency.

Since the farmers are generally a poor social group with low levels of motivation, their capacity for technological adoption is extremely low. It is accordingly very hard to get such farmers to improve existing enterprises, let alone endow them with a capacity for expansion or replication. Thus a one-year project is clearly not long enough. This aspect is further exacerbated by the fact that, at the trial phase, community participation is not cultivated, with the result that the continuity of results of the activities is placed in doubt.

**Recommendations**

1. There is a need for a thorough preparation phase, subsequent to the inventory study, for the formulation of programme activities. The following steps need to be taken before the implementation stage:
   - A further comprehensive inventory study should be carried out for each of the main activities. This should cover the real potential resources for development, the socio-economic conditions, and provide clear field maps which can be formulated as a database.
   - A detailed design for the development either of the district as a whole, or of the sub-subdistricts featuring the main activities, should be produced, and should be formulated as a project package. The design should describe each activity/project, and should cover the target totals, phasing, support activities (possibly including
funding from outside the PPW), community participation, and activities which are directed towards being taken over by private enterprise/investment.

- The project management staff should be properly prepared at the implementing agency level, both in terms of administrative and technical ability.

2. In connection with the abilities and availability of project management staff, as well as the conditions of the region and the available transportation, the choice of PPW regions should not be too many or too widespread. One or two kabupaten would suffice, with a concentration on two or three kecamatan within the kabupaten concerned.

3. The target group chosen should not be one which is too weak, but rather a dynamic group, and the number of target groups should not be too great. This will reduce overhead costs, and will mean that fostering can be intensive so that desired results are achieved in a relatively short period. There should also be a concentration on establishing the ability to continue the results in the period after aid has ceased.

4. There is a need to clarify the boundaries of the wilayah (region/district/area) for comprehensive planning, in a way which will guarantee spatial integration and the future continuation of benefits from the new system. Perhaps the wilayah kecamatan (kecamatan area) is most appropriate, because sectoral activities still require division according to administrative area boundaries.

Also, there has already been a UDKP (Unit Daerah Kerja Pembangunan [District Unit for Development Activities]) system based on kecamatan, but this has not been properly put into effect. If the UDKP system could be fully put into effect with PPW, expansion or replication would be made easier in the future.

5. As area development programmes, all PPW must be designed as part of the entire economic and social development plan in an area, with benefits specific to the locations, as well as providing linkages with surrounding areas.

Thus the planning of the PPW must take account of the resource endowments and regional assets in the area, so that development through them is integrated technically and spatially with activities.
Also, it is crucial that there should be development of planning capabilities from below, and an involvement of the private sector and the *Lembaga Swadaya Masyarakat*. This is so that the subsequent development can be carried out independently, and taken over by the community itself.
LSM/LPSM activities in NTT

Most *Lembaga Swadaya Masyarakat/Lembaga Pembina Swadaya Masyarakat*—LSM/LPSM—in NTT originally came from the initiative of an individual, but later developed into large institutions. Generally the LSM/LPSM in NTT are religious in background, and are sponsored by religious leaders. The services of these institutions are not confined to the members of the groups, however, but extend to the whole community in NTT.

With increasing links to the outside world, the support of domestic and foreign sponsors, and help from government policy, much opportunity is given for community participation in development. LSM/LPSM have begun to emerge in NTT which are not religious in background, and are more oriented towards the development of local community self-help.

Activities carried out by LSM/LPSM for the general population are aimed at preventing social problems from arising, and at strengthening and enhancing the community's ability and motivation to solve its own problems. The approach that is used is stimulating the development awareness and understanding of communities in respect of their problems and needs, as well as the ability to deal with these aspects.

In the process of community socio-economic development, the more prominent activities that LSM/LPSM have carried out include the following:
1. Increasing family income through farming, livestock, fishery, trades, household gardens, credit stalls, and seaweed cultivation enterprises.

The LSM/LPSM which are involved in these sorts of activities include the Yayasan Ie Rai; Yayasan Alfa Omega; Yayasan Pengembangan Masyarakat Pulau Semau; Yayasan Tanah Nua; Yaspensel; Yaspem; Yayasan IPP; Yasska; Delsos Keuskupan Kupang, Ende, Atambua and Manggarai and Sumba; BK3D and the All-NTT Credit Cooperative.

Fishery activities are a new field for LSM/LPSM in NTT, and this requires thorough research and planning as it concerns large amounts of funding:

2. Increasing skills through training and courses

In the framework of improving human resources and the quality of work performed, there has been training for motivators and management, and technical training in the fields of agriculture, livestock, cooperatives, fishing, sewing, and cooking skills, to prepare people to enter the world of employment.

3. Conservation of the environment through terracing, greening, and planting trees

The NTT environment, which is dry and barren, could provide attractive settlement locations if the people could conserve the environment through terracing, greening, and the planting of lamtoro trees. Efforts to build check dams and plastic reservoirs provide examples of conservation which can be found in Savu and Kupang, while terracing and others can be seen in Sikka, Ende, Ngada and East Sumba.

4. Improvement to the sanitation and cleanliness of settlement water supplies

Water is a critical problem for NTT, especially clean drinking water. There are three methods of overcoming this problem; that is, piping to bring spring water to settlement locations; digging wells with pumps; and establishing rainwater catchment tanks.

Up till now, Dian Desa is the only LPSM in NTT which has had a special programme for drinking water, although other NGOs have also participated in this activity.
More comprehensive details of the work of NGOs in NTT are given by Fernandez (1990).

Changes and results

Certain changes have occurred as a result of LSM/LPSM activities and other recent developments.

1. Changes in ways of thinking in the community

The existence of the LSM/LPSM as social institutions which give help based on a community development approach has succeeded to a certain extent in changing ways of thinking. Social activities which were initially viewed as charitable functions have experienced a shift towards a community development focus aimed at preventing social problems from arising, and at increasing the ability and motivation of communities to overcome their problems themselves.

In line with this, community development programmes in NTT generally attempt to utilize human resources. These programmes take as their starting point a community which understands its own problems, and has the motivation to improve the situation by utilizing its existing potential. LSM/LPSM which act in this way are Yayasan Ie Rai Kupang, Yayasan Alpha Omega Kupang, Propelmas Waikabubak, YASSKA Atambua, IPP Ende, YKS Maumere, and YASPEM Maumere (ibid.).

Increasing food production

Programmes aimed at increasing the production of food through dry-land agriculture, increasing incomes, and developing village institutions can be said to have reached the stage where they have elicited an understanding and interest in communities. However, in general they have not yet reached the point where they can organize and activate resources already present in those communities.

Increasing community participation in development

Thanks to the intensive foundation work of the LSM/LPSM, communities usually take an active part in development activities. But such participation is more in the form of mobilization efforts. Actual community participation has only reached the stage of implementing and
working on projects based on payment. The participatory function of planning and community initiative is still a long-term aim.

Socio-cultural change

A few years ago, traditional ceremonies incurred costs which were not insignificant and were consumed in a matter of a few days. These included wedding parties, funeral ceremonies and several other kinds of traditional celebrations. As a result of these cultural practices, much wastefulness occurred, but now these practices are gradually beginning to decline under the influence of new ideas.

Problems and obstacles

Some common obstacles arise in the community development activities:

1. Price changes sometimes cause difficulties in programmes which have been planned long in advance, meaning that funding received is not sufficient for implementing the activities originally proposed.

2. Setting up enterprises to produce items which are not compatible with the needs and tastes of consumers, and thus do not attract an economic market, can hamper further activities aimed at raising incomes.

3. LSM/LPSM administrators as well as donors sometimes feel that finances and staff are all that is needed to resolve problems in community development activities. But this may in itself be an obstacle, in that progress may be more a question of addressing relations between people, tackling community organizational issues, or of taking appropriate approaches to stimulating participation.

4. Inadequate levels of skills of LSM/LPSM staff sometimes undermine the effectiveness of their way of working and their approach to communities in the field.

5. Cooperation between technical institutes and LSM in the field is still weak, and their respective activities are all too often carried out separately, resulting in less combined impact.

6. There is a lack of information regarding both government and LSM/LPSM activities, which means that there is scope for both sides to learn from each other and share their experiences.
Recommendations

1. The GEMPAR programme of Pemda NTT needs to be intensified, so that it can truly become a movement which will grow and become rooted in NTT society.

2. Cooperation with universities, especially the research and development sections, will help considerably in providing input to Pemda and LSM, as well as to donors, in developing programmes for community development in NTT.

3. Cooperation between the private sector, Pemda, Koperasi Unit Pemda (KUD), and LSM/LPSM in their efforts to raise the incomes of the population will help the community to increase production, thus ultimately improving the welfare of families.

4. Good information about activities that require development, as well as about markets and marketing both within the country and abroad, must be provided urgently to Pemda, business enterprises, KUD, and LSM/LPSM. This requires the investigation and formation of an information centre in NTT.
As a starting point, let me describe very briefly the Nusa Tenggara Timur Integrated Area Development Project (NTTIADP) and Nusa Tenggara Agricultural Support Project (NTASP), which are both AIDAB undertakings. The NTTIADP is financed jointly by the Australian and Indonesian governments, with the objective of improving living standards of villages in the kabupaten (districts) of TTS and TTU. It is a five-year project which has recently been extended by a further year, and will now be completed at the end of March 1992.

The NTASP is part of a large project to develop agriculture and livestock in the eastern islands. AIDAB is co-financing the project with the World Bank, and there is also a contribution from the UNDP. AIDAB is funding technical assistance for farming systems research, livestock development (including livestock credit), cotton development, and the identification of IAD projects. The NTTIADP and NTASP projects complement each other in the areas of livestock and agriculture development.

In considering the roles of these two projects in the future development of NTT, it is necessary first to examine what they have achieved. Both projects have been reviewed over the past year, and out of these reviews and subsequent discussions have come strong recommendations over their roles and foci, with proposals for future development.

**NTTIADP**

*Sustainable development*

NTTIADP has as its principal aim sustainable development. To achieve this, it focuses on the development of the capacity and capability of government institutions to provide services and facilities to villages within selected districts of TTS and TTU. At the same time, it also aims to promote village participation in discussions of the facilities to be
provided and in their maintenance and repair. It also tries to harness such participation in identifying income-generating activities and other forms of village development.

The central premise of NTIADP is that the development of NTI is constrained by many factors, including shortage of water, poor access, limited markets, limited government services, and limited knowledge of improved farming systems. It is also assumed that these factors are interrelated, and need to be tackled as part of an integrated development programme. The integration involves improved planning, improved coordination of implementation, and improved approaches to the national policy of bottom-up planning.

The project is increasingly involving communities in the planning and provision of facilities and in the development of villages through utilizing their own resources. This is considered essential for sustainability.

Background

The NTIADP evolved from the Nusa Tenggara Livestock Development Project at Besi Pae in TTS. This was successful in developing technologies for water supply based on earth dams, and for increased livestock and agricultural production. In designing NTIADP as the successor to Besi Pae, a major change was made from the so-called project mode to an institutional development mode; from an approach which had been successful with high inputs in a limited area, to a kabupaten-wide project constrained by the capacities of government departments. This evolution defined the components of NTIADP and the technologies to be used. With the great benefits of 20:20 vision that we get in hindsight, it is clear that the concept of the project was correct, but that the details of the design were flawed through a lack of knowledge of how Indonesian government institutions operate. The project went straight into implementation, and spent the best part of the first two years sorting out planning aspects and obtaining a clear and agreed understanding of institutional development and what was meant by IAD. It is interesting to observe how little there was to draw on in terms of institutional knowledge from other AIDAB projects.

It is important to recognize the background from which NTIADP developed, in order not to reject the IAD concept on the basis of experience of NTIADP. The past three years of NTIADP have been
a major learning experience, in which many flaws of the original design have been identified and eliminated. Now that the project is operating very successfully and achieving its goals, it is to be closed down. The Government of Indonesia (GOI) considers that to achieve the full impact of the project a further two or three years are required. I would agree that the original time frame was too short, and that we need to get away from thinking that development is suited by a five-year time horizon.

A recent study of IAD projects in Indonesia found that in all cases the time frame of five years was too short. Compared with most of these projects, NTI ADP is well advanced. At a recent workshop on NTI ADP, a GOI official stated that less than 20 per cent of projects in Indonesia achieved their targets in the original time frame. The study of IAD projects has recommended that instead of thinking in terms of projects, donors should think in terms of programmes. This is particularly important in NTT, where the resources to implement programmes are amongst the poorest in Indonesia in terms of equipment, human resources and institutional capacities.

Components and complications

As I said earlier, the components of NTI ADP were largely determined by what had been demonstrated as Besi Pae. To the livestock development, food crops and dam technology of the latter were added roads, community development, soil conservation, regional planning and a university component. At the same time some important aspects of development in NTT, such as health and pre-tertiary education, were not included.

This multi-faceted approach involving many government departments leads to the common criticism of IAD projects that they are too complicated. NTI ADP, with nine components, has demonstrated the complications of coordination and implementation. At the same time it has shown how essential it is that some form of integration and coordination does occur. As an example, the provision of water supplies involves discussion with the communities, identification of sites, dam construction, fencing and planting of catchments, piping of water to villages, and training in ongoing repairs, maintenance and management of the water supply. This should involve Bangdes, Bappeda, Pengairan and Peternakan, but typically in Indonesia each department has oper-
ated independently with its own time frame. This has resulted in an endless number of poorly located facilities which are not maintained, and which are not seen as meeting village requirements.

On NTTIADP, we are coming to the conclusion that such coordination is essential, but that the complicated problem of integration might best be tackled by planning in an integrated manner and then implementing the plan sequentially. This would also avoid the problem of villages being suddenly swamped by an invasion of agency staff.

This approach would require an initial planning phase of perhaps two years when the details of a project were designed, the method of operations defined, the agencies defined, and budgeting and institutional arrangements laid out in accordance with the GOI budgeting system. Such a route would overcome the problems encountered by NTTIADP in trying to implement and plan at the same time within the same villages.

It would also address the problems of Bappeda and Bangdes trying to coordinate many agencies providing a range of inputs in the same place at the same time. Bappeda, which is responsible for regional planning, is severely constrained in the staff it has to plan development in villages, coordinate its implementation, and then monitor and evaluate its impact.

The work of defining how new IAD projects should operate follows from the recommendations of the Mid-Term Review of NTTIADP, which was undertaken by AIDAB in late 1988. (Indonesia and Australian International Development Assistance Bureau 1989). The Mid-Term Review defined the primary goals of the project as institutional development and description of the IAD process.

This focus has been agreed to by the Indonesian government, and the project is now concentrating on a description of how further IAD projects should be planned and implemented. This description will draw heavily on the experience of NTTIADP, but will also include proposals which have not been tried but which are considered improvements over the previous NTTIADP approach. After this process or model description is completed, AIDAB is to have a mini-review and decide whether the project should start to design a new project in East Sumba. The Indonesian government is keen to proceed with further IAD-type projects in NTT.

It is planned that the basic design of new projects would be done by Indonesian project personnel, with some assistance from advisors using
the IAD process or model as the blueprint of steps to be followed. Components of new projects might be the same as in NTTIADP, but they would be based on the particular constraints and potentials of the area being examined.

The success of NTTIADP

The success of NTTIADP varies according to the particular components. The Mid-Term Review concluded that the project’s engineering components (roads and dams) had been very successful, and could be closed early with all targets achieved. In fact, the physical targets of the project which were considered ambitious at the start can easily be achieved. The physical part is easy, but the institutional components involving changes of attitudes and approaches are slow. However, these are essential for sustainability.

What is now becoming noticeable is the lack of guidance or information from other projects on how to tackle institutional problems. It is amazing how little guidance AIDAB or other donors can provide from previous projects on solutions to problems of repairs and maintenance and of village participation. It is also clear that while infrastructure elements are quick to give results in technical terms, their general long-term impact falls rapidly because of a failure to tackle sustainability. To have lasting impact, the relatively weaker agencies such as Bangdes and Bappeda should receive very strong support.

Some of the technology of NTTIADP for livestock and agriculture has been questioned, and it is clear that more applied research on farming systems is required. Even now the best available technologies can be expected to improve incomes and living standards—for example, with vegetables—but to achieve these expectations we must improve our understanding of adoption through better monitoring and evaluation of Dinas programmes. Some of this is happening, but changing approaches, systems and attitudes takes time.

A number of new projects have been identified by NTTIADP. AIDAB has requested that NTTIADP should highlight projects which develop from NTTIADP activities, but which require separate funding and different means of implementation, and the first of these projects are now being identified. A project to develop tree crops as part of the farming system has been pinpointed, with good prospects for development. This would build on work started under the Pertanian component of NTTIADP, but which NTTIADP did not have the
mandate to develop. These projects may be sectoral and will be proposed for funding by AIDAB and other donors. Other aspects which come to mind are the need for improved resource data for planning, and for a management information system so that Bappeda can monitor and evaluate the many new projects in NTT.

Before going on to look at the NTASP scheme, the following points about NTTIADP should be noted:

- It is considered by the GOI to be successful in developing the activities it has undertaken, but an extension of time would be desirable to optimize impact and consolidate sustainability.

- NTTIADP has demonstrated that the implementation of physical targets through a Dinas is relatively easy to achieve; the hard task is to get coordination among agencies and incorporation of villagers, so that activities and facilities achieve the desired impact and are sustainable.

- GOI policy on decentralization and bottom-up planning will require continued efforts to strengthen the capabilities and capacities of provincial kabupaten and kecamatan agencies. There is plenty of evidence that these agencies are already overstretched.

- A time frame of five years is inadequate to properly plan and implement any form of development for areas of NTT. To achieve the desired objectives and have a continually expanding impact, it is necessary to look at long-term programmes rather than at projects. These programmes should be implemented through government departments' existing structure, and be consistent with their long-term funding capabilities.

- Notwithstanding the policies on decentralization and bottom-up planning, central government involvement is vital to the success of any new projects. NTTIADP started at kabupaten level and has progressively become more involved at provincial and national level. With hindsight, it would have been more logical to work down the other way.

- NTTIADP has identified many new areas where inputs are required for the development of NTT, including basic and applied research and policy development. These areas will be further elaborated over the remaining two and a half years of the project.

- NTTIADP has made good ground in improving the institutional capabilities of agencies with which it is working, but a sustained
programme is required to build on this groundwork. There remains a need for a clear assessment of the overall framework for NTT development, and for a coordination of programmes and projects, if the benefits to NTT are to be maximized.

NTASP

The NTASP is a complex project which covers NTT and NTB. In discussing it here, I will deal with the components relating to NTT. The project as a whole supports integrated area development, cattle distribution, cotton research and development, road construction, soil conservation, farmingsystems research and development and non-government organizations. AIDAB is financing technical assistance, which in NTT covers cattle distribution, farming systems research, and cotton research and development. In the areas of cattle distribution and farming systems research, NTASP is complementary to NTTIADP.

The NTASP project, like NTTIADP, entails institutional development. It is addressing the need for improved institutional and financial mechanisms for getting technical solutions into practice.

The processes of research, development and technology transfer have tended to be regarded as unrelated endeavours. Information from farmers on their technical problems does not flow into the research and extension systems. Nor are research, production and extension agencies sufficiently coordinated to produce cost-effective innovations appropriate to the needs of farmers and suitable for sustained production and protection of the environment.

Also, organizational and financial arrangements for promoting development are sometimes obscure and inappropriate to the needs of districts and villages. Examples which the NTASP has encountered in its operations and is addressing include: the rigid and unsuitable timing of cattle purchases in the cattle development sub-project; difficulties of cost-sharing when a number of institutions are involved in collaborative enterprises; and the problems of effective operation of demonstration plot; and conduct of verification trials.

In NTT, these challenges are particularly important. The limited resources available and increasing assistance being provided is straining the capacity of the physical and institutional infrastructures to support the successful implementation of programmes and projects. The NTASP has also encountered problems with project design which,
in leading to a narrow focus on a particular issue, has made it difficult to address complexities of the research, development and technology transfer process. This has led to wasted opportunities in creating integrated development programmes.

The NTASP has expended almost A$500,000 on training. Much of this has focused on research management, methodology and techniques, and has been very effective in training more than 200 people.

**Review**

The NTASP was reviewed in the first quarter of 1989 (World Bank 1989), and it was concluded that ‘on the whole the project concept and design appeared to be appropriate’ (*ibid.:2*). It was noted that the sectoral components were linked to respective national systems and had the benefit of technical back-up, but that the provincial activities included too many ‘loosely hanging’ activities without technical and management back-up from national systems. This reflected the difficulties of implementing a decentralization programme in what has been a highly centralized system. The review considered that the greatest strength of the project organization was that it was built within the existing national provincial and district level structure, and that implementation arrangements were supportive of the concept of decentralized planning and implementation.

The review considered that the approach to decentralized (bottom-up) planning and implementation had shown good results. But it did note that a very common problem in Indonesia, delays in the release of budgets, had adversely affected implementation.

Other important conclusions were that the project produced an effective vehicle for providing GOI staff with opportunities for ‘learning by doing’, and that it thereby made an important contribution to institutional development.

An interesting point was the comment that after only two years of effective implementation, no definite results on impact or sustainability could be expected. Contrast that with AIDAB’s review of NTTIADP, which after less than two years of effective implementation made substantial judgements on impact and sustainability. The World Bank and AIDAB obviously work on different time frames, but the World Bank’s frame seems to be more realistic.

In terms of overall implementation of the project, the review recommended that:
• An overall development strategy for each of the project kabupaten should be prepared, and activities should be rigorously prioritized.
• The emphasis should be on consolidating activities that had been successfully implemented, rather than on expanding to new kabupaten.
• Efforts should continue to strengthen the process of decentralized planning, implementation and funding of development activities.
• Monitoring of project activities in physical and qualitative terms should be imposed, and systematic, ongoing impact evaluation of the various components should be done, as essential inputs for future project preparation and for redefining GOI's strategy for area development projects.

These recommendations are very much in line with thinking in the programme of NTTIADP, and support the need for a continuing role in the strengthening of NTT institutions, particularly in the planning, policy and management spheres.

Specifically, in respect to the Farming Systems Component, the review recognized the importance of farming systems research (FSR) in an area which is agro-ecologically distinct from other parts of Indonesia. It recommended that this input should be expanded for the remaining two years of the project to include four long-term advisers (FSR adviser socio-economist, FSR agronomist/agro-ecosystems analyst, livestock farming systems scientist and soil moisture conservation specialist) plus short-term consultants. AIDAB has agreed to fund this input, although budgetary difficulties may delay it.

In terms of the long-term development of NTT, agriculture is a critical area. It is one of the limited resources by which the majority of inhabitants can increase their living standards. The FSR component of NTASP has a vital role in identifying farming systems which can achieve this goal. The major challenge will remain in translating the research results through the extension system to farmers.

The review recommended that cotton research should be integrated with FSR, so that eventually a cotton crop could be incorporated in suitable areas of NTT through FSR. It did not support further cotton development work under NTASP. It noted that in the absence of a sound technical package and the declining interest of farmers in growing cotton (particularly on Flores) it would not be justified to continue with activities like stock seed production and distribution, establishment of demonstration plots and related work.
The cattle development sub-project of NTASP comprises a cattle credit distribution programme and technical support on feed supply, animal health and animal husbandry. The review made many recommendations on this component including:

- the need to establish the production coefficients of the major cattle production systems in Nusa Tenggara;
- the need to distribute more cattle in areas where they may be used for draught purposes; and
- the need to buy breeding females from the larger and extensively managed herds.

The review also recognized that the requirement to pay more attention to forages and feeding. It did not recommend the inclusion of more districts in the programme.

At present there are uncertainties about how NTASP will operate this financial year, with the budgetary limitations of AIDAB and with the United Nations Development Programme (UNDP) also reviewing its contribution. It is to be hoped that, given its importance in addressing critical development issues, the funding is available to the end of the existing project and also for a new project or phase of the existing project.

Further aspects
Regarding the roles of NTTIADP and NTASP in the future development of NTT, there are a number possibilities. They involve: changes to technology; impact on AIDAB development policy in the eastern Islands; an impact on other donors; the improved planning of development and improved implementation of projects; and the identification of new development projects. Let us examine each of these in turn.

Changes to technology
NTTIADP has been successful in technology transfer in food crops, tree crops, livestock, forage, water supply, roads, catchment planning and soil erosion, agricultural and livestock research and the knowledge of university students.

The jury is still out on how long-term some of these impacts will be, but it is clear that initiatives with vegetables, fruit trees, poultry, new forage species and earth roads will continue after the project. In the case of vegetables, we are now concerned about a potential oversupply
situation. Dam construction technology has been successfully transferred to the point where dams are largely built by Indonesian staff. The environmental/soil conservation aspects have also improved, both in terms of the technical capability of staff and, equally important, in terms of questioning the appropriateness of some existing government programmes—for example, those with check dams. The project is now addressing the question of how its approach and technology will be confirmed as parts of ongoing programmes.

It is recognized that considerable research, particularly applied research, is required on farming systems of NTT. The identification of the most suitable farming systems is the role of NTASP, and the expansion of the NTASP Farming Systems Component focuses on that need.

While NTTIADP has worked in two kabupaten, some of the people trained and part of the equipment supplied are provincially based, and will be available at the end of the project to undertake development in other areas of the province.

The project has prepared manuals on roads and dams, and produced considerable extension material. This has been done through an Indonesian structure, so that it can be utilized on a much broader scale than through the project. In this way NTTIADP will have a long-lasting and widespread influence in NTT.

Both projects are institutional development projects in that they work through existing government structures. They do not create special units or structures. This is their strength in long-term development. The day the projects finish, their technology and development will not stop. This is a key consideration for future development for NTT, and a point for all donors to bear in mind.

Impact on AIDAB's development policy in the eastern islands

NTTIADP and NTASP will have an important role in influencing AIDAB's future development programme in the eastern islands. AIDAB has stated that the eastern islands are a priority area, and in looking at the type of projects which it may wish to fund, it is important to learn from the experience gained from NTTIADP and NTASP.

While the impact of some components of both projects has still to be optimized, the GOI is keen to see further developments, with suggested new IADs in East Sumba and possibly other kabupaten, and also an extension of NTASP.
It is important that AIDAB does not look for overly simplistic solutions to complex problems. Australian technology must be modified for application in NTT, whether it is in agriculture, conservation, engineering or community development. In some cases this may require research, but in many cases it can be modified on the basis of best guesses and knowledge of the institutional, sociological, economic and political situations.

A combination of multi- and single-agency projects is likely to be appropriate. These should be properly institutionalized; and if AIDAB is to be influential in this area, the projects are likely to involve policy and planning in agencies such as the governor’s office, Bappeda and Bangda. It is also important to tackle issues related to decentralization. Of particular importance is the need to put together a proper planning base for the province as a whole, and for each district. Novel approaches to community development involving Bangda and non-government organizations also need to be examined, drawing on the experience of NTTIADP and NTASP.

As the eastern islands are a priority area for AIDAB’s programme, it would be visionary if NTTIADP and NTASP were seen as the initial stage in a long-term strategy to develop this part of Indonesia.

**Impact on other donors**

NTTIADP and NTASP also have a role in influencing the development programmes of other donors. This will be done by identifying new projects which could be funded by any donors, as well as by developing the capacity of NTT institutions to plan, coordinate and manage new projects. The institutional capacity of NTT government agencies is already stretched, and one objective of NTTIADP and NTASP has been to improve the structure and operation of these agencies. This is constrained by the fact that many procedures and operations are national and cannot be modified at the kabupaten or provincial level. Nevertheless, improvements have been made, although this institutional constraint may be the major factor limiting successful development in NTT in the short- to medium-term future.

**Improved planning and implementation**

An important lesson from NTTIADP is how essential it is to get any project properly designed and planned before implementation. The Nusa Tenggara Livestock Development Project (NTTLDP) was considered a pilot project for NTTIADP, but in fact was only a pilot project.
for testing technology. It was not replicable in wide areas on any sustainable basis, nor did it provide a basis for implementing a project through relevant agencies. NTTIADP has suffered from the lack of a phase when participating agencies planned programmes, developed clear budgets, and included the project in their DUPS, DIPS, and other planning documents. Hence NTTIADP went straight into implementation, and then tried to develop a proper planning system. For the future, a framework for planning development and designing projects or programmes will have been defined.

For NTT this framework will be a major benefit, since the educational levels of most staff are low and there is a desire to follow guidelines. The guidelines will not prescribe a model or recipe, but will set out steps to be followed. For agencies such as Bappeda provincial level, this will greatly improve their capacity to produce development programmes. NTIIADP has also identified the need for a management information system (MIS) to improve monitoring and evaluation of implementation, as well as to assist with planning. However, the project has neither the resources nor the time to develop a suitable system at this point.

Help in identifying new development projects
As mentioned earlier, NTIIADP can be expected to develop a new project for East Sumba (subject to an AIDAB mini-review), and also a series of new projects which may be sectoral. It further has a role in providing training and experience for GOI staff in this process, so that an ongoing series of coordinated projects can be developed.

Conclusion
NTTIADP and NTASP have been pioneering endeavours in some aspects of NTT development. They have demonstrated that Australia can provide the staff and management to undertake complicated development in a difficult part of Indonesia. A study comparing a number of IAD projects in Indonesia concluded that NTIIADP has done well in comparison with most others (Macartney 1989). NTIIADP and NTASP have also had an important role in improving and expanding on Australian–Indonesian relations in this politically sensitive area.
AIDAB’S APPROACH TO NTT DEVELOPMENT

Peter Charlton

Introduction

Before addressing the theme of my chapter, I would like to briefly outline some other aspects of AIDAB’s Indonesia programme in order to place our efforts in NTT within a broader context.

The Indonesia programme is second in size only to that of Papua New Guinea, but in itself is the most diverse programme and contains some of the largest bilateral projects administered by the Bureau. In the financial year 1988–89, Australia spent over A$70 million on foreign aid to Indonesia. At the last meeting of the Inter-Governmental Group on Aid to Indonesia (IGGI) in April 1989, Australia pledged to maintain its expenditure at around A$73 million.

Within the above amount, AIDAB administers programmable aid which in 1988–89 totalled A$45.4 million on bilateral projects, training and co-financing. The budget for 1989–90 provided $A48.3 million, which was considerably lower that anticipated. This is making it difficult to develop a pipeline for future projects to come on stream as others finish. There are people involved in administering ongoing projects who have already felt the pinch, and have been required to cut back activities and expenditure during the current financial year so as to assist us in keeping within the announced budget figure.

This cut will affect some plans to commence new activities in the eastern islands but in most cases it will mean a deferral of initial action rather than their exclusion from the programme. Some of these activities will be discussed later.
Why NTT?

During the past few years the Indonesia programme has been undergoing a comprehensive review. Agreement has been reached between the governments of Australia and Indonesia on an overall strategy for the most effective and mutually acceptable package.

AIDAB’s ‘Indonesia Country Paper’ (Australian International Development Assistance Bureau 1989) provides details of the strategy for Australia’s current aid programme, and the basis for our sectoral and geographical focus. A more comprehensive paper which contains some interesting statistics can be obtained through the AIDAB library.

The geographical focus on the eastern islands of Indonesia, that is eastwards of Bali to Irian Jaya, does not preclude us from activities in other parts of Indonesia. It does, however, give us a clear mandate to concentrate on a particular area of the country on the basis that the eastern islands:

- include the poorest provinces in Indonesia whose development has a high priority under *Repelita V*;
- have a gross domestic product per capita less than half of the rest of the country;
- have infant mortality rates, life expectancy rates, etc., which are significantly worse than in other areas of Indonesia.

Other reasons taken into account in the concentration on eastern Indonesia include:

- the similarity of climatic and geographic conditions with the drylands of Central and Northern Australia. Australian agricultural expertise in these conditions offers much scope for dryland farming, and is more relevant than traditional wetland practices imported from Java;
- the fact that the region has, until recently, been relatively neglected by other donors;
- the proximity to Northern Australia, which is more obvious now that regular air flights and shipping are in place. Darwin and Kupang are developing close neighbourly relations, and the people of both areas are becoming familiar with each other through increased commercial, educational, tourist and social contacts.

Against this background, the evolution of a geographic focus on the eastern islands appears to be logical. In fact, I prefer to be involved in
a programme with this focus rather than the previous ‘scattergun’ approach.

Many Australians do not appreciate the various factors and complexities taken into account in maintaining a bilateral relationship with a large and important neighbour such as Indonesia. Under these circumstances, it is much easier to defend the aid programme with some conviction now that we have established a focus on a region which has demonstrably more needs than other parts of Indonesia. Travel in the province of NTT, contact with the people, and more understanding of the environment in which they live confirms that we are operating in the right place, or at least one of them.

Activities in NTT

At present there are several important project activities underway and in the planning stage, and some have already been addressed by previous authors. These activities are described in Table 18.1.

Table 18.1: Australian aid activities in NTT

<table>
<thead>
<tr>
<th>Nusa Tenggara Timor Integrated Area Development Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commenced/completion</td>
</tr>
<tr>
<td>Australian commitment</td>
</tr>
<tr>
<td>Managing agent</td>
</tr>
<tr>
<td>Main counterpart</td>
</tr>
<tr>
<td>Agreement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nusa Tenggara Agricultural Support Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commenced/completion</td>
</tr>
<tr>
<td>Australian commitment</td>
</tr>
<tr>
<td>Managing agent</td>
</tr>
<tr>
<td>Main counterpart</td>
</tr>
<tr>
<td>Agreement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Eastern Indonesia IKK (Ibu Kota Kecamatan) Water Supply Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commenced/completion</td>
</tr>
<tr>
<td>Estimated Australian input</td>
</tr>
<tr>
<td>Managing agent</td>
</tr>
<tr>
<td>Main counterpart</td>
</tr>
<tr>
<td>Agreement</td>
</tr>
</tbody>
</table>
Table 18.1 (continued)

*Eastern Indonesia IKK Water Supply Design Study*

<table>
<thead>
<tr>
<th>Commenced/completion</th>
<th>Australian commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 1987–April 1989</td>
<td>A$1,400,000</td>
</tr>
</tbody>
</table>

*Eastern Islands Veterinary Services Project*

<table>
<thead>
<tr>
<th>Commenced/completion</th>
<th>Australian commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 1989–1993</td>
<td>A$4,960,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Managing agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW Dept of Agric. and Fisheries</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main counterpart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directorate General of Livestock Services, Department of Agriculture</td>
</tr>
</tbody>
</table>

*Eastern Universities Project*

<table>
<thead>
<tr>
<th>Commenced/completion</th>
<th>Australian input</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989–1994</td>
<td>A$26,000,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Managing agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>W.D. Scott, Macquarie Univ., James Cook Univ., ACIL Australia Pty Ltd</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main counterpart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directorate General of Higher Education</td>
</tr>
</tbody>
</table>

*NTT Forestry Sector Support and Watershed Management Project*

<table>
<thead>
<tr>
<th>Feasibility study</th>
<th>Australian input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late 1989–early 1990</td>
<td>A$50,000</td>
</tr>
</tbody>
</table>

*Indonesia and Australia Technical and Vocational Education Project - A*

<table>
<thead>
<tr>
<th>Commenced/completion</th>
<th>Australian commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early 1990–1995</td>
<td>A$18,840,000 (approx.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main counterpart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directorate of Technical and Vocational Education, Department of Education</td>
</tr>
</tbody>
</table>

*The Nusa Tenggara Timur Integrated Agriculture Development Project (NTTIADP)*

Because of its size and importance, it is appropriate for me to discuss this particular project, but without going into any detail. The goals, objectives and various components of the project are described in the project publication (*Departemen Dalam Negeri, Australian International Development Assistance Bureau and ACIL Australia Pty Ltd 1988*). The project has played a vital role in making Australia’s presence known in
NTT. It is worth noting that a major benefit from the project is the fact that a number of people who have contributed to the project as advisors or short-term consultants are now working in other development activities in the province, thus utilizing and building on the valuable experience already gained.

**Mid-Term Review (MTR)**

The major issues emerging from the MTR, and actions being taken to implement the recommendations, have already been dealt with in Chapter 17 of this volume. I will simply list a number of aspects of the review, and their bearing upon future activities which may be undertaken by AIDAB:

- The review was a joint GOA/GOI exercise in the true sense, and the Indonesian team members played an active and significant role.
- The results did not please everyone, especially those who had anticipated a major extension.
- It identified the need for the NTTIADP to concentrate on developing international aid, bureaucratic IAD implementation procedures and institutional strengthening, and the consolidation of village inputs essential for sustainability.
- The provincial agencies wish to concentrate on field activities as they will be judged on the project's impact in the villages; this conflicts to some extent with the long-term objective of developing IAD processes, which may not result in returns for NTT.
- The review acted as a catalyst in developing a greater interest and stronger commitment to the project by the central government agencies involved.

Given its size and complexity, the NTTIADP has received more than its fair share of criticism. The MTR considered that the project was too large and ambitious, which was perhaps more a reflection of the unrealistic time scale. Thus there is widespread opinion that IAD projects should be implemented over periods of up to fifteen, maybe twenty years. Despite other criticisms, there were some very complimentary things said about the project, however. Unfortunately, the AIDAB format for such reviews under ACB 26 focuses on problems and main issues, and this leads to a somewhat negative report.

The GOI is clearly committed to the NTT project, as evidenced by the relatively high level of funding that has been provided during a difficult fiscal period. The representatives from Jakarta now travel frequently to the province, whereas in past years this was not the case.
As a result they have developed a much better understanding of the issues, and are enthusiastic supporters of the project and its objectives.

Discussions with Bappenas reveal that the GOI is hopeful that the project will come up with sound IAD processes which could be replicated in other regions. Central government funds are available for expenditure on projects aimed at helping the rural poor in outlying and underdeveloped provinces. The problem is that they lack suitable projects to act as a conduit for the transfer of funds.

After NTTIADP—what?

It is unlikely that AIDAB would agree to an extension of the project beyond its completion in 1992. It is likely, however, that we would be looking for a project, based on the IAD processes developed under NTTIADP, to be implemented either in NTT or elsewhere in the eastern islands. Such a project would probably be smaller in scale, and involve less agencies than the current project. It would be difficult to predict what components might be involved, but it could consist of combinations of existing elements plus other new activities including community health, education, potable water etc.

One possibility could be the 'Son of NTTIADP', based on the existing project area of Kabupaten TTU and TTS. Such a project could be designed around a relatively small component such as agricultural foodcrops, agro-forestry or a seed and plant propagation programme. Additional components could be incorporated as a means of continuing some of the critical activities of the present project, e.g. follow-up work in villages on water management groups, dryland farming and livestock systems. This would be especially relevant for villages developed in the later stages of NTTIADP, i.e. in years 4 and 5. In effect this would provide a ‘care and maintenance’ programme which would enhance the prospect of sustainability and protect the investment made under NTTIADP.

Summary

The suggested approaches of AIDAB to NTT development are speculative at this stage, and any future AIDAB involvement would be subject to priority requests by the GOI during our regular high-level consultations. Subject to such requests, we would then arrange project identifi-
cation and design missions before seeking ministerial approval to commit Australian funds.

One of the casualties of the 1989/90 financial year cuts is the proposed NTT Forestry Sector Support and Watershed Management Project, which was to be established in Soe in Kabupaten TTS. This activity had previously been endorsed by the GOI as a high priority, and it is the first approach made to Australia to become involved in the Indonesian forestry sector. We have not removed it from the programme, but have been forced to defer action until sufficient funds become available. Accordingly, we will keep it on our books and, it is hoped that a feasibility study can be started towards the end of the financial year 1989/1990. It is even possible that this project could be used as a vehicle for the ‘care and maintenance’ programme that I mentioned previously as a means of providing continued support for some of the key follow-up activities in NTIADP villages in Kabupaten TTU and TTS.

One thing is certain, however, and that is that the Bureau would wish to capitalize on the present Australian activities in NTT. As shown in Table 18.1, there are ongoing activities in the province which will ensure a continuing Australian presence for some time. The new projects in the education, livestock and forestry sectors will, or already have, benefitted from our substantial involvement in NTT. The opportunities for useful collaboration between projects are increasing, and the benefits are significant.

It is apparent that AIDAB will have to draw on the resources of people such as those who participated in the Canberra Workshop on ‘Potentials for Socio-Economic Development in Nusa Tenggara Timur’. Otherwise the Bureau runs the grave risk of failing to utilize much hard-earned experience and refusing to learn from past mistakes. That forum and others of the same provide us all with a means of increasing our knowledge and sharing our experience of NTT.
Introduction

A new long-term development framework is needed in all fields so that the people of Nusa Tenggara Timur (NTT), who belong to the same ethnolinguistic group, can enjoy a higher level of general welfare than they are experiencing now. The directions of development which need to be considered and which should be undertaken can be outlined as follows:

1. Various marine natural resources which are plentiful, and have not yet been seriously considered and utilized, should be exploited in the future. To this end, the orientation of the livelihood of the majority of NTT’s population has to be diverted towards the sea, meaning that the population pressures on land natural resources would be reduced. However, such a change in orientation would require research and education, both of which require considerable financial resources, effort, time and a resolve to succeed.

2. There is a need to gradually make ladang (unirrigated) cultivation and traditional animal husbandry (which place conflicting demands on space) more complementary. To this end, one possibility is to provide animals with fodder from the cultivated plants on the one hand, and, to urge cultivators to use animal faeces as fertilizers on the other. Cooperation between cultivators, animal breeders and regional governments is greatly needed, so that cultivators and breeders can be educated, trained and guided in such a manner that they eventually cooperate with each other. A failure to harmonize the relationship between the growing number of cultivators and breeders will result in a continuing destruction of environmental
and natural resources. This will further lead to a never-ending cycle of socio-economic problems.

3. The planting of long-term plants to meet the requirements of food, animal fodder and firewood, as well as to become a source of income for village farmers, should be planned and then intensified. The types and the amounts of long-term plants need to be quantitatively determined for each farming family and others in the villages. Without such determination, the call by the central government to implement the 'movement to improve people's traditional income' would be seen as empty rhetoric, even though this call is of great significance for the ecological balance and the raising of the income of the village population in NTT, which by and large still lives below the poverty line.

The government’s call includes the planting of more fruit trees, and appears to be made on the assumption that this is an easy task; thus every inhabitant can dig a hole for the purpose of planting trees, which will then yield fruits, animal fodder and firewood.

However, in reality the implementation of such a call is relatively difficult. Hence, the lontar plant (Borasus sundaicus), which has been totally exploited as an all-purpose plant by the inhabitants of Roti and Savu islands, has not been treated systematically in this way by people in other parts of NTT, although such has been done by people in Bojonegoro and on the island of Madura. Professor James J. Fox suggests that the lontar plant is mainly regarded by most people in NTT as a plant for herbal remedies (Fox 1977).

Again, many varieties of coconut and candlenut trees in West Timor and Sumba have been neglected, and also destroyed every summer when dry grasses are burned. Once more, the tamarind plant (Tamarindus indica) has various uses in West Timor and in the district of Sikka, but has suffered from lack of attention. Many coffee plants in the various districts of Manggarai have similarly been mismanaged.

4. Agricultural pilot projects with integrated tree plantation schemes can be seen as a good approach. But they appear not to be operational in some rural areas, even though such projects have been successfully implemented in Besi Pae in South Central Timor and in Sukabitetek in the district of Belu. These cases can be regarded
as examples of tentative routes in integrated agriculture, which have been implemented with scientific principles and advanced agricultural technology. They have been actively supported by village farmers in the places mentioned. The reasons for the failure of the integrated agricultural farming methods in other areas of NTT needs to be investigated.

Some of these aspects are now explored in more detail, but further background on environmental issues in particular is also given by Ormeling (1955), Metzner (1977 and 1983), Ataupah (1983), and the Agro-ecosystem Research Group (1986).

Unirrigated cultivation and traditional extensive animal husbandry in NTT

NTT has two seasons, wet and dry, like the rest of the Indonesian archipelago. However, a peculiar feature of NTT is that its dry season is relatively longer than the wet season. The former could last from 150 to 200 days, so that the short heavy rainfall does not have a lasting impact on the long dry season which is also windy. As a result, there is a greater risk involved in planting seasonal food crops. However, history shows that in NTT it is precisely seasonal food crops that have become dominant in the diet of the population.

The main food crop that is grown using dryland agricultural methods in NTT is corn, which is usually planted and mixed with various beans, nuts and marrows. These seasonal crops can be adequately combined with yearly and long-term crops. As a result the risk of total crop failure is low, but the yields of these plants in such combinations are low.

Such risk and small productivity have led many farmers in NTT to be very cautious in planting new plants, even though they are not completely closed to new options. However, such cautiousness results in the slow acceptance of new seed types, which are perceived to have difficulties in surviving the harsh savannah conditions of the NTT islands. Therefore it is difficult to bring about changes in planting patterns, which are firmly rooted in the traditions of NTT.

What is needed is a careful attitude in delivering new agricultural technologies. If this attitude can incorporate education, training and
long-term guidance, the development process in the NTT can be intensified.

Most farmers in NTT also keep animals, in the form of chickens, pigs and goats. Large animals such as buffaloes, horses and cattle are rarely kept, except by village leaders who own big farms. The large animal breeders mainly have Balinese cows in West Timor, and Ongkole cows in Sumba. With this uneven ownership of large animals, and given that the village heads are the ones who have greater political power, the small farmers tend to lose in any competition for land. As both parties need land, this has become very scarce.

The effect of the conflict between land cultivators and animal breeders has been the disappearance of grasslands in the NTT. Since animals suffer from food shortages during the dry season, unirrigated fields which are not planted or which do not have strong fences can easily be entered by these animals. After their presence, it is difficult to regain the vegetation and fertility of the land. This process is also known as the ‘tragedy of common access to property’.

A regulation of the maximum number of animals per unit area is difficult to implement because the traditional leaders, who exercise authority in rural villages, tend also to be owners of large animal farms. Furthermore, formal regional government bureaucrats, as well as merchants and others, often own large animals as well. Therefore the rivalry and conflict of interests between the land cultivators and owners of animals has further intensified as the numbers in each group grow.

Various efforts to alleviate the negative effects of the above developments on the natural and socio-political environment are needed. If a solution is not found, development efforts will always be constrained.

**Possibilities of integrated agricultural development**

With foreign aid, efforts have been made to establish various forms of integrated agriculture. The partnership between the governments of Indonesia and Australia has enabled the implementation of an integrated agricultural development project based on experience in a project at Besi Pae in the South Central Timor district. Utilizing the experience, science and technology from Australia, a series of artificial lakes have been built.
Before being named Besi Pae, this place (and that part of it which is now used for research, office and dwelling place) was called Pu'babu. This term originates from a word compound in the Meto language which consists of the word *Pu'un* (a cluster of small trees) and *babu* (a type of liana tree which sheds its leaves in dry season, but which has stems that contain sufficient moisture for drinking). There are many places with the name 'Pu'babu' in very dry areas of West Timor, and in such places anyone with thirst can find relief.

The place Pu'babu in Southern Amanuban subdistrict in South Central Timor had its name changed, as suggested by the traditional elders who were interviewed and examined by Professor Fox. The new name was purposely endowed with a scientific intention, and a hope that it would encourage local unirrigated cultivators and animal breeders to take an active and positive role in the integrated agricultural pilot project. The term 'Besi Pae' is an abbreviation of the names of two ancestral heroes, *meo Besi* (a hero with qualities of iron and steel) and *meo Pa'e* (a fortuitous hero), who successfully defended that dry area from an enemy takeover.

After the end of the traditional tribal warfare on West Timor at the turn of the century, the area was used for hunting. It was only in the early 1950s that it began to be used for unirrigated agriculture and animal pastures. Thus the forest covering the area was eliminated, with the result that people needed to go further to obtain water during the dry season. In addition, the sanitary conditions facing cultivators and breeders were extremely distressing before they were provided with the artificial lakes.

With a greater availability of water for human settlement, animal farming and food crops (particularly vegetables), it is hoped that the welfare of the farmers will improve. It is hoped too that the above name change will appeal to the traditional pride of the local people, and encourage them to actively participate in the project through hard and systematic work.

However, the transfer of technology through the Besi Pae project appears to be very slow, and indeed has not yet materialized. The cause of this must be properly investigated by scientific analysis, so that a transfer of technology can occur. A similar problem appears also to have characterized the PDP II project, which is jointly funded by USAID and the Indonesian government.
Thus in PDP II, a cultivation pattern, which can easily observed by farmers at Sukabitetek in the Beludistrict and in other places, appears to have not been immediately implemented in a *mutatis mutandis* manner. It is as if the efforts of demonstrating integrated agriculture have been ignored. Since there are other examples of such a problem, the suggested tentative routes towards the development of NTT need to be further scrutinized. Of course, no one wants to see farmers unable to absorb the technology provided to them. It is not easy, however, to modify a tradition of mixed cultivation into an integrated agricultural system based on a much more advanced technology.

**Tree planting**

The people of NTT have been accustomed to live by utilizing trees which are specifically planted for their fruits. They also have been used to utilizing plants which have various economical and other applications, and which only need minimum efforts in their establishment and maintenance. Within this scenario, efforts have been made to intensify the planting of coffee, candlenut, cloves, cacao, cashew nuts and other economic plants. However, yields under such intensified cultivation have not been good. It should be noted that under usual circumstances many farmers follow their own intuition in planting a particular tree in a particular area, and in selecting previously neglected plants for renewed use.

The people of the island of Rote and Savu, who have either stayed on their islands or migrated elsewhere, have for generations employed the palmyra palm or *lontar* as a multi-functional plant. However, *lontar* has not been properly established or maintained: the seeds have not been systematically cultivated, nor planted in sufficient numbers to meet the demand derived from various uses of this tree. For this reason, Professor Fox suggests that the people of Rote and Savu mainly use the plant for medicinal purposes, to support their physical, social and cultural needs. But if people do this, they will only be able to attain a low standard of living based on making herbal medicine. At present this may be true for a small minority, but it does not apply to most people from that area.

As a consequence of the neglect by their owners or planters, there are many young coconut and candlenut trees which have been destroyed by grass fires in the dry season in West Timor and Sumba.
The earlier head of the district (bupati) of Belu, Mr. A.A. Bere Tallo, frequently joked about how the people of his district often planted coconuts but left them in the care of God the Creator. The consequences of such neglect are even more serious for tamarind trees than for coconut or candlenut trees, and the former have been also cut down by unirrigated cultivators. Unfortunately, such traditional neglect, which additionally characterizes coffee plants in Manggarai and West Sumba (although not as seriously as with tamarind), cannot be eliminated quickly even though many of these plants have great potential benefits.

Conclusion

The above analysis may contain a discordant note, but is not intended to discredit the farmers of NTT who still need to have their standard of living improved through various agricultural development efforts. However, there are some village farmers in NTT who have successfully cultivated vanilla, cloves and other cash crops. In addition, some coconut farmers in Ende, Sikka and East Flores have also achieved a degree of success and are able to enjoy a relatively high standard of living. This is to the point that they are able to provide schooling for their children in the same way as the coffee farmers in Manggarai and West Sumba districts.

Unfortunately, the examples of these people are not being followed by farmers in other areas, but their activities serve to demonstrate that good opportunities exist.
CONCLUSIONS AND RECOMMENDATIONS

Colin Barlow

This rich collection of specialist chapters helps in pinpointing the difficulties of Nusa Tenggara Timur, and the constraints on its economic and social progress. But the same chapters also reveal exciting possibilities for improvement, given that such constraints are overcome. A key problem is to achieve the latter, thereby releasing the province's major potential for growth.

NTT's position as a classic remote and disadvantaged regional economy is graphically portrayed by Manuwoto, who ranks the province as 'low growth, low income' in respect of economic development (Manuwoto: Table 6.1). Manuwoto also indicates the adverse affects on NTT of Indonesia-wide trade policies which favour areas of concentrated industry and international ports such as Java, while penalizing agricultural commodity-producing regions including NTT (ibid.:51).¹

Other basic difficulties of the province are explored through a number of chapters. Thus the dry, fragile, and often damaged ecosystem; irregular weather patterns and variable micro-climate; lack of accessible water; poor physical infrastructures; remoteness from the Indonesian heartland; health problems through endemic malaria and other sicknesses; and other human resource problems in terms of lack of entrepreneurship and motivation and inadequate training facilities, are all reviewed (Barlow and Gondowarsito; Comer; Duggan; Boeky; Ayre-Smith; Pellokila et al.; Purba; and Ataupah). A further difficulty perceived by some as hindering economic transformation (Barlow and Gondowarsito: 22–23; Djemarut: 181) are the elaborate social structures in NTT. These vary from district to district under circumstances where not only is there ethnolinguistic diversity, but 'culture is a product of the interaction between people and their environment' (Boeky: 65). Yet it is also pointed out that such cultural richness 'can act as a source of

¹Works cited without the year of publication refer to chapters in this volume.
internal dynamics' \textit{(ibid.: 65)} and be a vital ingredient in healthy growth.

As in similar contexts elsewhere (Schultz 1964; Johnston and Kilby 1975), the ‘traditional’ activities of NTT residents are well adapted to their circumstances, where a cleverly fashioned pattern of risk-minimizing subsistence activities is dominant (Ataupah: 225) and ‘the farmer's principal objective is to produce sufficient food for household needs’ (Pellokila \textit{et al.}:123). Until this subsistence objective is met, possible cash returns from other enterprises and new technological ventures will be downplayed, especially if they entail uncertain outcomes or initial investments \textit{(ibid.:141)}. Because of these conditions, markets are not well developed, and the few that exist essentially cater for the limited produce people wish to sell and for the limited items they wish to purchase (Forge:176–174).

Yet despite such circumstances, important new agricultural innovations and ideas have been adopted over time (Ayre-Smith; Pellokila \textit{et al.}), resulting in changed cultivation patterns and increased outputs. It is manifest too, however, that such adoption imposes stresses which may take years to work out, and even threaten long-term agro-economic sustainability. This is true, for example, of the introduction from early this century of cattle which, although generating high returns, have also created ‘conflicting demands on space’ by animal breeders and crop cultivators (Ataupah:224), and caused a ‘tragedy of common access to property’ \textit{(ibid.: 226)}. This has led to widespread environmental destruction (Ormeling 1955; Pigg:105; Ataupah:226), while there has further been a marked shift to a more uneven distribution of income (Ayre-Smith: 90–92; Barlow and Gondowarsito:20).

It is in fact important to recognize that both cattle and other more intensive agricultural activities have often encouraged divergences between the ‘private’ viewpoints of individuals engaged in such ventures and the ‘public’ viewpoint of wider society. With cattle, the relatively few breeders and traders have benefitted greatly from extending their enterprise, while others in the community have suffered from soil deterioration and further environmental damage brought on by excessive grazing. Similar consequences arise from exploitative cultivation practices by individual small farmers (Pellokila, \textit{et al.}: 140–141).

While excesses of this nature were historically regulated through internal community sanctions (Metzner 1982), the widening integration of the economy, taken with the elimination under modern pressures of
village institutions (Boeky: 70) and erosion of local initiative, have either weakened or removed such local controls.

Under all these circumstances, government intervention is viewed as necessary, both to help in bridging divergences of this nature and to assist in overcoming other basic difficulties outlined earlier (Manuwoto: 53; Corner: 40). The central and regional governments have each made great efforts to this end (H. Fernandez: 11; Djemarut: 183–184). But the task is formidable and one prime thrust of such policies—the introduction of new technologies—has been complicated by variable climatic, soil, and social conditions. A blanket approach of offering a single technology package has often not worked, as occurred with the counterproductive effect of using bench terracing to arrest soil erosion in Timor (Duggan: 34). Experiences of such inappropriate packages add to peoples' pre-existing caution, and make them 'justifiably suspicious of the technocrats' (ibid.: 36).

Another prime ingredient in government efforts to assist development has been through providing physical and other infrastructures, and this has much improved the province's situation with schools, electricity generation, roads, and other facilities from its earlier miserable level (Appendix I, Table 19 and Rasyidi 1990). But it is also apparent that 'social' development has been harmed by the tendency of bureaucracies to regard expenditures on health and education facilities as a 'residual item of public consumption' (Corner: 46), and by the Jakarta-centric pursuit of broad national targets that may not address the real (and locally variable) needs of particular parts of NTT (ibid.: 49). In particular, there is huge progress still to be made in providing clean and accessible water supplies to the large majority of the rural population that still does not get these (Kantor Statistik 1976–88). Again, official efforts to better market infrastructures, and notably to sponsor KUD as a help in trading inputs and outputs, do not seem to have been very effective (Barlow and Gondowarsito; Forge: 177). As well, government actions to remedy the currently poor access of people to the information and credit they need in adopting new technologies appear to have been too minor to be helpful (Barlow and Gondowarsito; Pellokila et al.: 137, 139, 142).

The institutional means of channelling government assistance with new technologies, infrastructures and other aspects is also a matter of concern, where the past approach of spreading help relatively thinly through a province-wide network of offices has been subject to criticism as being too little to have much effect. Recent cuts in national resources
for development have also curtailed what can be done through official channels. In this context, using foreign aid for development purposes is seen as a useful avenue, where this aid is employed to correct sectoral or sub-regional imbalances (Djemarut: 182). Such aid can be directed to Regional Development Programmes (Proyek Pengenbangan Wilayah, or PPW), while Indonesian official finance is used for broader purposes. In NTT, this policy has been most prominently implemented through the Provincial Area Development Project (PDP II) of USAID, the Nusa Tenggara Agricultural Support Project (NTASP) of the World Bank and AIDAB, and the Nusa Tenggara Integrated Area Development Project (NTTIADP) of AIDAB (Djemarut: 184–190). Each of these projects has involved large remittances from abroad as well as substantial Indonesian contributions, and essentially comprised 'a package of sectoral activities aimed directly at a target group where the location is usually a desa (village)' (Djemarut: 190).

Yet despite considerable impacts in terms of improving technologies and infrastructures, enhancing farmers' and local officials' skills, and raising productivity and incomes, all these foreign projects are judged to have common and serious problems (Djemarut: 189–190). These are said to entail a lack of any detailed prior project design in favour of ad hoc on-the-job planning, an absence of monitoring, and an undue concentration on sectoral as opposed to a regional foci, a lack of training for Indonesian staff, an unsatisfactory administrative link with the Indonesian official apparatus, an unduly short one-year term of most project activities in given places, and a failure to harness much community participation. Many of Djemarut's criticisms have also been echoed by Moffat (203–204), who further wants a clearer focus with a sequential approach. Charlton (220) suggests that future Australian projects in the region should be on a smaller scale and involve less agencies. Ataupah brings up the appropriate technology question in relation to both PDP II and the earlier Australian Nusa Tenggara Timur Livestock Development Project (NTTLDP) at Besi Pae, where 'the transfer of technology has been very slow, and indeed has not yet materialized' (Ataupah:227). Ayre-Smith points to the lack of coordinated planning, and to the fact that 'in many countries ... in the past ... many resources have been squandered on a host of projects and endeavours that were often unrelated and unsustainable' (Ayre-Smith: 85).
But although these negative views should certainly be taken into account, it is also wise not to understate either the positive impacts or a possible longer-term significance of the various official efforts. Hence while confirming the slowness with which farmers adopt particular new technologies, Piggin (110) also records his personal observation of a progressive increase in planting new forages following the years of patient adaptive research. Again Moffat (205–207) indicates the huge benefits to NTTIADP personnel of experiences gained, including lessons learned in matching activities to the real needs of local communities. As well, it is apparent to the writer that Bappeda and other concerned departments are now adapting far better to the problems of working with foreign projects, and seem likely to overcome earlier planning and administrative difficulties.

It is further clear from a wider perspective which takes account of experiences from similar development projects elsewhere that these frequently offer a progressive stimulus to local initiative, which takes long to awaken but then expresses itself in surprising ways that vehemently encourage economic and social development. Indeed, it is all too easily forgotten that ‘the wheel of development turns continuously’, and that once take-off is commenced, there is ‘an increasing growth of initiative, creativity and independence within society’ (H. Fernandez: 7). It should finally be observed on the positive side, and despite the problems mentioned, that the average annual growth in RGDP of NTT was still well above the rate for Indonesia as a whole for 1976–86 (Appendix I, Table 1).

**Looking to the future**

The chief recommendations springing from individual chapters are summarized in Appendix II, while more specific recommendations from the study by Barlow *et al* (1990) are given in Appendix III.

There seems no doubt, despite the problems discussed, that external interventions by government and other parties are needed to help realize the potential of NTT for growth and improvement. The world of traditional activities at village level crucially requires assistance from outside in the form of better technologies, skills and credit to use these technologies, and improved physical and social infrastructures. Such
interventions should be properly planned and integrated, however, and follow patterns which jointly address both sectoral (economic) and spatial (institutional and geographical) aspects (Boeky: 65). To be sustainable, interventions should also entail full community participation, and involve a decentralized thrust, with a recognition of the need for *bebas tantra* (Boeky: 70, 71). The policy of ‘weak and strong points’ (Djemarut: 184) should be further considered, where projects may be deliberately sited in ‘strong’ places where they have important spread effects in surrounding regions.

Yet it is important to recognize that a degree of irreconcilability exists between the integrated and coordinated approaches suggested on the one hand, and the decentralized local initiative-taking proposed on the other. This conflict is not addressed specifically in any chapter, and both routes have in fact been sometimes canvassed by the same author (Pellokila et al; Ayre-Smith; Djemarut; and Moffat). The conflict must nonetheless be faced in constructing realistic future development strategies. In West Sumatra an integrated overall policy that still provided for inputs from outside the government structure, and for close interaction at village level, seems to have been followed successfully (Zain) and much can be learned from them. It is also important to note in this connection that one good way of linking external interventions and village involvement more closely is the involvement of NGOs which, with their small size and more locally based nature, can often better achieve this difficult objective (M.S.O. Fernandez: 195–196).

**Relevant institutional arrangements**

What then, is the best organizational way of channelling external interventions to assist in development? Inevitably, because of the difficulty of making substantial changes to the firmly established Indonesia-wide government structure, much official intervention must continue to be executed through the provincial network of departments. But there is a strong case for reassessing the balance of such activities, and for streamlining them to a more effective focus. Again, useful reliance can continue to be placed on official projects undertaken through foreign aid, but here adjustment should also take place in light of the criticisms reported earlier. It would seem appropriate to go for rather smaller projects with clearer thrusts, which can achieve the difficult balance of being better integrated into current government structures as well as having stronger links with affected communities.
Projects should also be executed with a longer-term horizon, permitting an evolutionary adjustment to circumstances and enabling truly sustainable arrangements to be put in place.

In addition to this adjustment of departmental and foreign-sponsored project work, however, there is a strong case for following the strictures of *Repelita V* and putting much more weight on NGOs, each of which tend both to have expertise in particular spheres and to concentrate in particular districts (M.S.O. Fernandez 1990:215–218). And although these NGOs still have far to go in securing wholehearted community involvement (M.S.O. Fernandez[this volume]:197), experience in how to operate more effectively is growing. While the frequent criticism is made that NGOs, by virtue of their small size, cannot undertake provincial development on a scale having substantial impact, the recent rapid growth in their numbers, sizes, and range of activities tends to belie this. But some government coordination is certainly needed regarding the location and focus of activity of NGO work, both to ensure maximum impact and avoid overlapping. Given this important prerequisite, NGOs have the advantages not only of better community interaction, but also of being more easily able to tailor their activities to local needs. They often have the further good feature of access to foreign funds.

Apart from NGOs, private businesses constitute the other non-official group which can be a major engine of growth. Such businesses can be expected to flourish in dynamic reaction to opportunities provided by technology, infrastructure developments, or other successful activities. Small businesses can especially assist in broadening the process of local economic growth, while larger businesses can offer important linkages to outside markets as well as bring in capital and innovations.

Encouraging, coordinating and monitoring these various interventions must be the responsibility of *Bappeda*, in conjunction with other government authorities. There is no doubt *Bappeda* should be given adequate resources to perform this hard but crucial task (Barlow and Gondowarsito:28; Corner: 50)

*Necessary policy ingredients*

There are certain key ingredients to be included in development policies executed through institutional arrangements of the nature just outlined. In line with earlier discussions, these ingredients may be suitably classified under the heads of 'technology' and 'infrastructures'. More specific policy recommendations under these heads have already been
made in various chapters, as summarized in Appendix II. But some broader considerations in technology and infrastructure policies are now treated.

Technology must remain a prime ingredient of most external interventions, but must be adapted to the requirements of differing situations. Hence while the 'basic innovations' needed to achieve higher output and other potential benefits are generally adequate in NTT (as in similar contexts), these innovations still have to be modified appropriately to the particular conditions where they are applied (Ahmed and Ruttan 1988). Thus in the sphere of forage betterment, pastures are a source that can be manipulated, managed, or improved with the application of new technology (Piggin). But doing this requires considerable adaptation of available basic forage technology, and is a matter of very considerable investment and time-consuming research taking many years. It is simply not sufficient to follow the approach of 'best guesses' suggested by Moffat (p.212).

There is further the vital question in technology policy of whether a 'low' or 'high' input approach to improvement should be used (Pellokila et al.:134–136). The logic of the NTT situation suggests the former, it being more reasonable in most circumstances to begin with a robust low-input technology that can be adopted by farmers without much extra skill and little requirement of external inputs. Then over time, as farmers' skills and cash to buy inputs increase, it should be possible for them to use progressively more sophisticated technologies which use higher inputs, but also provide greater outputs and net returns. This is what Walker (1981) has termed a 'gradient' approach in technology delivery. In practice in NTT, therefore, farmers should start by moving to slightly more complex cultivation techniques such as additions to multiple cropping, but should later progressively supplement these adjustments with new varieties, fertilizers, and other chemicals (Pellokila et al.:134–135).

The task of technology adaptation to local needs can really only be undertaken satisfactorily through a network of official research facilities, where researchers can be given the long-term facility necessary to make such efforts effective. With agriculture where most adaptation needs to be done, it is logical to base this activity on the relevant section of the Agency for Agricultural Research and Development (Pellokila et al.:134, 137), whose work on cropping and livestock systems is already beginning to suggest promising new technologies.
Infrastructures importantly include physical items such as roads, bridges and ports, where there is little objection to previous policy as implemented by the Department of Public Works. Such items should be allocated giving more consideration to spatial aspects, however (Boeky: 66–67). With social infrastructures of health and education, however, strategies should be tailored more to specific local conditions (Corner: 50; Manuwoto: 60–61). This especially applies in providing adequate water supplies to local communities, but also involves addressing other kinds of variable circumstances from district to district. And although the particular types of health and education service needed are not directly addressed in this volume (but see Susetio 1990), this aspect must be seriously taken into account in development policies. What, for example, is the best way for the Department of Health to organize puskesmas services, and how should the provision of these and of central health facilities be balanced? What is the best makeup of activities at each level of educational institution, and how should the mix of these levels be determined? Ways of making agricultural extension services more effective at the farmer level than at present must also be tackled. Social infrastructures pertinent to marketing inputs and outputs further need close policy attention. The latter seem likely to entail private sector groups and NGOs more than government departments, and include such crucial features as credit facilities and the arrangements for distributing improved plants and animals.

None of the interventions just discussed explicitly address the serious issue of private–public divergencies mentioned above. But establishing social infrastructures that provide education and agricultural extension will help in remedying the present lack of information and in breaking down cultural constraints, where both problems are root causes of such divergencies. The question of direct government approaches to contain divergencies through regulating exploitative activities is not addressed in the preceding chapters, but must be faced in policy discussions.

**Sectoral concentrations**

Apart from including the key general policy ingredients of technologies and infrastructures, the important policy question remains of sectoral improvement thrusts. As mentioned, suggested foci of these thrusts are summarized in Appendices II and III.
The chapters in this book may be seen as denoting consensus that agriculture, with its major subsistence and employment role, must receive the prime attention (Manuwoto; Boeky; Pellokila et al.; Djemarut; and Ataupah). Within agriculture, the main subsistence crops—maize and dry paddy—deserve emphasis, while cattle and the cash crops, coffee and cocoa, are key items. For cattle, the questions of raising forage availability is crucial, and deserves continuing effort (Ayre-Smith; Piggin). Among less prominent sectors, fisheries are a sphere where introducing new equipment and market linkages can be expected to be good economic investments (Mendez 1990; Barlow and Gondowarsito). Tourism further offers good prospects for certain locations, where there are excellent opportunities for local peoples in providing various services (Umbu Peku Djawang: 157–158). Again, there are important opportunities to be followed up in downstream activities, especially in improving cattle quality and processing fish and coffee (Barlow and Gondowarsito: 27–29). There are also good prospects for developing the broad-based village weaving industry with its unique product (Purba: 146–148). All these sectoral possibilities once more rely heavily on parallel infrastructure improvements of the nature discussed.

In summary, the chapters indicate several promising routes towards the further economic and social development of Nusa Tenggara Timur, although they also reveal manifold problems. Yet there is little doubt that, given ways of overcoming the latter, the peoples of NTT will respond vigorously to the opportunities available. The task of government and other improvers is to facilitate this response, and it is hoped that the discussions herein assist substantially in that regard.
APPENDICES
# APPENDIX I

## SUPPLEMENTARY TABLES

### Table 1: Economic and social performances in NTT and all Indonesia, 1980s

<table>
<thead>
<tr>
<th>Indicators</th>
<th>NTT</th>
<th>All Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita ('000 Rp, 1986)</td>
<td>228</td>
<td>578</td>
</tr>
<tr>
<td>GDP growth (% p.a., 1976–86)</td>
<td>7.6</td>
<td>5.9</td>
</tr>
<tr>
<td>Population (1987)</td>
<td>3,087,000</td>
<td>170,180,000</td>
</tr>
<tr>
<td>Population density (‘000/km², 1987)</td>
<td>65</td>
<td>185</td>
</tr>
<tr>
<td>Labour force participation rate</td>
<td>69.6</td>
<td>57.3</td>
</tr>
<tr>
<td>(number in labour force + number of persons 10 years +, 1986)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of labour force in agriculture (1985/86)</td>
<td>86</td>
<td>55</td>
</tr>
<tr>
<td>Infant mortality /000, 1986</td>
<td>88</td>
<td>72</td>
</tr>
<tr>
<td>Health centres /000 population, 1987</td>
<td>0.22</td>
<td>0.13</td>
</tr>
<tr>
<td>Education (excluding high schools, 1986–88)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- students/000 population</td>
<td>52.6</td>
<td>56.0</td>
</tr>
<tr>
<td>- teachers/000 population</td>
<td>3.3</td>
<td>3.6</td>
</tr>
<tr>
<td>- schools/000 population</td>
<td>0.20</td>
<td>0.16</td>
</tr>
<tr>
<td>Share of population below Sayogyo poverty line, 1986</td>
<td>54</td>
<td>20</td>
</tr>
<tr>
<td>Asphalt roads (km/000 population, 1986)</td>
<td>0.67</td>
<td>0.52</td>
</tr>
<tr>
<td>Rice yield (t/ha., 1987)</td>
<td>3.1</td>
<td>4.2</td>
</tr>
<tr>
<td>Maize yield (t/ha., 1987)</td>
<td>1.4</td>
<td>1.7</td>
</tr>
</tbody>
</table>

*Source: Kantor Statistik (1976–88); World Bank (1988).*
### Table 2: Composition of RGDP*, NTT, 1975–86 (%)

<table>
<thead>
<tr>
<th>Sector</th>
<th>1975</th>
<th>1980</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture&lt;sup&gt;b&lt;/sup&gt;</td>
<td>69.1</td>
<td>57.1</td>
<td>53.9</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Industry</td>
<td>2.3</td>
<td>3.5</td>
<td>2.3</td>
</tr>
<tr>
<td>Electricity, gas and water</td>
<td>0.1</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>Construction</td>
<td>2.2</td>
<td>2.1</td>
<td>2.7</td>
</tr>
<tr>
<td>Commerce, restaurants and hotels</td>
<td>9.2</td>
<td>10.3</td>
<td>12.4</td>
</tr>
<tr>
<td>Transport and communications</td>
<td>1.8</td>
<td>3.2</td>
<td>6.6</td>
</tr>
<tr>
<td>Banks and financial institutions</td>
<td>0.2</td>
<td>0.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Rents</td>
<td>3.5</td>
<td>2.7</td>
<td>1.9</td>
</tr>
<tr>
<td>Government</td>
<td>10.1</td>
<td>18.8</td>
<td>19.5</td>
</tr>
<tr>
<td>Other&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.3</td>
<td>1.3</td>
<td>2.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Total actual RGDP (Rp billion)<sup>d</sup>

<table>
<thead>
<tr>
<th></th>
<th>1975</th>
<th>1980</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>317.6</td>
<td>488.0</td>
<td>716.4</td>
</tr>
</tbody>
</table>

**Notes:**

<sup>a</sup> RGDP = Regional Gross Domestic Product, i.e., the gross domestic product of NTT, in this and succeeding tables.

<sup>b</sup> Includes fisheries and forestry.

<sup>c</sup> Mainly services not included in other items.

<sup>d</sup> These figures are actual RGDP in 1986 constant prices. Constant prices for 1986 in this and succeeding tables were determined through weighting by the consumer price index for the NTT (1986 = 100).

**Source:** *Kantor Statistik* (1976-88).
<table>
<thead>
<tr>
<th></th>
<th>Averages</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>4.0</td>
<td>4.4</td>
<td>-1.8</td>
<td>11.4</td>
<td>6.8</td>
<td>6.8</td>
<td>3.6</td>
<td>6.6</td>
<td>10.2</td>
<td>1.8</td>
<td>4.4</td>
<td>5.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>7.5</td>
<td>7.9</td>
<td>28.8</td>
<td>6.0</td>
<td>8.2</td>
<td>45.3</td>
<td>16.2</td>
<td>49.7</td>
<td>6.7</td>
<td>9.0</td>
<td>-14.8</td>
<td>15.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>23.5</td>
<td>22.7</td>
<td>22.0</td>
<td>3.4</td>
<td>23.1</td>
<td>8.9</td>
<td>3.2</td>
<td>-1.5</td>
<td>-20.0</td>
<td>8.8</td>
<td>0.0</td>
<td>6.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity, gas and water</td>
<td>22.8</td>
<td>18.6</td>
<td>24.6</td>
<td>34.1</td>
<td>22.3</td>
<td>82.8</td>
<td>37.7</td>
<td>-5.9</td>
<td>40.0</td>
<td>9.7</td>
<td>9.7</td>
<td>26.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>8.5</td>
<td>8.4</td>
<td>14.5</td>
<td>1.6</td>
<td>6.8</td>
<td>17.8</td>
<td>55.1</td>
<td>4.2</td>
<td>3.1</td>
<td>6.6</td>
<td>-8.5</td>
<td>10.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commerce, restaurants and hotels</td>
<td>13.8</td>
<td>3.3</td>
<td>12.6</td>
<td>10.2</td>
<td>17.7</td>
<td>1.4</td>
<td>15.9</td>
<td>23.0</td>
<td>4.2</td>
<td>10.4</td>
<td>5.7</td>
<td>10.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport and communications</td>
<td>25.5</td>
<td>28.5</td>
<td>20.9</td>
<td>20.7</td>
<td>18.4</td>
<td>31.7</td>
<td>22.2</td>
<td>8.4</td>
<td>56.1</td>
<td>1.4</td>
<td>10.0</td>
<td>22.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank and financial institutions</td>
<td>24.9</td>
<td>29.4</td>
<td>66.4</td>
<td>28.2</td>
<td>26.4</td>
<td>29.1</td>
<td>44.5</td>
<td>29.3</td>
<td>18.8</td>
<td>11.4</td>
<td>12.4</td>
<td>29.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rents</td>
<td>2.7</td>
<td>3.1</td>
<td>3.9</td>
<td>2.8</td>
<td>4.8</td>
<td>2.8</td>
<td>3.1</td>
<td>2.5</td>
<td>-10.6</td>
<td>1.5</td>
<td>2.6</td>
<td>1.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>5.8</td>
<td>13.3</td>
<td>47.0</td>
<td>20.3</td>
<td>34.4</td>
<td>13.3</td>
<td>2.4</td>
<td>1.4</td>
<td>-8.6</td>
<td>6.6</td>
<td>10.7</td>
<td>13.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others*</td>
<td>7.7</td>
<td>8.2</td>
<td>21.4</td>
<td>7.4</td>
<td>3.5</td>
<td>28.5</td>
<td>12.2</td>
<td>12.8</td>
<td>41.9</td>
<td>-1.3</td>
<td>7.2</td>
<td>13.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total RGDP</td>
<td>6.2</td>
<td>6.3</td>
<td>7.4</td>
<td>12.1</td>
<td>11.5</td>
<td>9.1</td>
<td>7.0</td>
<td>7.3</td>
<td>7.0</td>
<td>3.8</td>
<td>5.4</td>
<td>7.6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note:
* Mainly services not included with other items.

<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>1975</th>
<th>1980</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food crops</td>
<td>68.6</td>
<td>60.6</td>
<td>60.3</td>
</tr>
<tr>
<td>Estate tree crops</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Livestock</td>
<td>12.3</td>
<td>16.7</td>
<td>21.8</td>
</tr>
<tr>
<td>Smallholding tree crops</td>
<td>11.7</td>
<td>13.8</td>
<td>9.1</td>
</tr>
<tr>
<td>Fisheries</td>
<td>6.6</td>
<td>7.4</td>
<td>7.4</td>
</tr>
<tr>
<td>Forestry</td>
<td>0.7</td>
<td>1.4</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Contribution to actual RGDP (Rp billion)</strong></td>
<td><strong>219.6</strong></td>
<td><strong>278.5</strong></td>
<td><strong>384.6</strong></td>
</tr>
</tbody>
</table>

**Note:**

These figures are actual agricultural RGDP in 1986 constant prices.

**Source:** Kantor Statistik (1976-88).
Table 5: Local agriculture and fishing, NTT, 1987

<table>
<thead>
<tr>
<th>Kabupaten</th>
<th>Wet paddy</th>
<th>Dry paddy</th>
<th>Maize</th>
<th>Cassava</th>
<th>Sweet potatoes</th>
<th>Groundnuts</th>
<th>Coconut</th>
<th>Coffee</th>
<th>Cocoa</th>
<th>Cloves</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>West Timor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kupang</td>
<td>7.7</td>
<td>2.5</td>
<td>20.8</td>
<td>2.1</td>
<td>0.5</td>
<td>2.5</td>
<td>12.5</td>
<td>0.1</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>TTS(^a)</td>
<td>1.7</td>
<td>0.3</td>
<td>40.4</td>
<td>15.3</td>
<td>3.2</td>
<td>0.3</td>
<td>4.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>TTU(^a)</td>
<td>2.5</td>
<td>3.0</td>
<td>14.4</td>
<td>3.1</td>
<td>0.7</td>
<td>0.5</td>
<td>3.0</td>
<td>0.2</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>11.9</td>
<td>5.8</td>
<td>75.6</td>
<td>20.5</td>
<td>4.4</td>
<td>3.3</td>
<td>19.8</td>
<td>0.6</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Belu and Alor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belu</td>
<td>2.8</td>
<td>0.7</td>
<td>17.4</td>
<td>4.4</td>
<td>0.5</td>
<td>0.8</td>
<td>13.7</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Alor</td>
<td>0.2</td>
<td>3.6</td>
<td>8.2</td>
<td>2.2</td>
<td>0.4</td>
<td>0.0</td>
<td>4.4</td>
<td>1.2</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3.0</td>
<td>4.3</td>
<td>25.6</td>
<td>6.6</td>
<td>0.9</td>
<td>0.8</td>
<td>18.1</td>
<td>1.5</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Flores</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flores Timur</td>
<td>0.3</td>
<td>4.0</td>
<td>10.5</td>
<td>2.5</td>
<td>0.1</td>
<td>1.8</td>
<td>14.4</td>
<td>2.1</td>
<td>1.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Sikka</td>
<td>1.2</td>
<td>11.0</td>
<td>14.1</td>
<td>7.5</td>
<td>0.7</td>
<td>0.9</td>
<td>20.9</td>
<td>1.3</td>
<td>8.7</td>
<td>1.4</td>
</tr>
<tr>
<td>Ende</td>
<td>4.0</td>
<td>5.5</td>
<td>9.3</td>
<td>7.5</td>
<td>0.1</td>
<td>0.4</td>
<td>10.4</td>
<td>1.3</td>
<td>0.2</td>
<td>0.7</td>
</tr>
<tr>
<td>Ngada</td>
<td>5.5</td>
<td>2.7</td>
<td>14.5</td>
<td>2.3</td>
<td>0.8</td>
<td>0.5</td>
<td>16.0</td>
<td>2.2</td>
<td>0.2</td>
<td>0.7</td>
</tr>
<tr>
<td>Manggarai</td>
<td>20.3</td>
<td>5.1</td>
<td>8.2</td>
<td>11.6</td>
<td>4.6</td>
<td>0.6</td>
<td>6.4</td>
<td>16.2</td>
<td>0.5</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>31.3</td>
<td>28.3</td>
<td>56.6</td>
<td>31.4</td>
<td>6.3</td>
<td>4.2</td>
<td>68.1</td>
<td>23.1</td>
<td>10.7</td>
<td>3.8</td>
</tr>
<tr>
<td><strong>Sumba</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sumba Barat</td>
<td>7.7</td>
<td>8.8</td>
<td>21.6</td>
<td>9.4</td>
<td>1.4</td>
<td>0.8</td>
<td>22.5</td>
<td>11.4</td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Sumba Timur</td>
<td>5.0</td>
<td>1.8</td>
<td>8.3</td>
<td>4.3</td>
<td>0.6</td>
<td>0.6</td>
<td>12.5</td>
<td>0.8</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>12.7</td>
<td>10.6</td>
<td>29.9</td>
<td>13.7</td>
<td>2.0</td>
<td>1.4</td>
<td>35.0</td>
<td>12.2</td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>58.9</td>
<td>49.0</td>
<td>187.7</td>
<td>72.2</td>
<td>13.6</td>
<td>9.7</td>
<td>141.0</td>
<td>37.4</td>
<td>11.4</td>
<td>4.3</td>
</tr>
</tbody>
</table>
Table 5 (continued)

<table>
<thead>
<tr>
<th>Kabupaten</th>
<th>Tree crop planted areas ('000 ha)</th>
<th>Livestock ('000 head)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cashew</td>
<td>Candlenut</td>
</tr>
<tr>
<td>West Timor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kupang</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>TTS</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>TTU</td>
<td>1.1</td>
<td>0.9</td>
</tr>
<tr>
<td>Total</td>
<td>2.4</td>
<td>3.2</td>
</tr>
<tr>
<td>Belu and Alor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belu</td>
<td>1.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Alor</td>
<td>5.1</td>
<td>3.9</td>
</tr>
<tr>
<td>Total</td>
<td>6.3</td>
<td>4.2</td>
</tr>
<tr>
<td>Flores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flores Timur</td>
<td>4.7</td>
<td>3.0</td>
</tr>
<tr>
<td>Sikka</td>
<td>7.7</td>
<td>-</td>
</tr>
<tr>
<td>Ende</td>
<td>1.6</td>
<td>2.1</td>
</tr>
<tr>
<td>Ngada</td>
<td>1.9</td>
<td>1.5</td>
</tr>
<tr>
<td>Manggarai</td>
<td>2.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Total</td>
<td>17.9</td>
<td>10.1</td>
</tr>
<tr>
<td>Sumba</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sumba Barat</td>
<td>2.5</td>
<td>-</td>
</tr>
<tr>
<td>Sumba Timur</td>
<td>1.2</td>
<td>3.3</td>
</tr>
<tr>
<td>Total</td>
<td>3.7</td>
<td>3.3</td>
</tr>
<tr>
<td>Grand Total</td>
<td>30.3</td>
<td>20.8</td>
</tr>
</tbody>
</table>
### Table 5 (continued)

<table>
<thead>
<tr>
<th>Kabupaten</th>
<th>Pigs ('000 head)</th>
<th>Goats ('000 head)</th>
<th>Sheep ('000 head)</th>
<th>Chickens ('000 head)</th>
<th>Ducks ('000 head)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>West Timor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kupang</td>
<td>207.0 (21.8)</td>
<td>114.9 (54.9)</td>
<td>71.0</td>
<td>835.6</td>
<td>7.6</td>
</tr>
<tr>
<td>TTS</td>
<td>121.0 (34.1)</td>
<td>45.3 (0.4)</td>
<td>-</td>
<td>279.9</td>
<td>4.7</td>
</tr>
<tr>
<td>TTU</td>
<td>56.2 (9.8)</td>
<td>17.5 (4.4)</td>
<td>-</td>
<td>88.4</td>
<td>4.3</td>
</tr>
<tr>
<td>Total</td>
<td>384.2 (65.7)</td>
<td>177.7 (59.7)</td>
<td>71.0</td>
<td>1203.9</td>
<td>16.6</td>
</tr>
<tr>
<td><strong>Belu and Alor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belu</td>
<td>73.7 (18.5)</td>
<td>44.0 (8.5)</td>
<td>-</td>
<td>26.9</td>
<td>2.9</td>
</tr>
<tr>
<td>Alor</td>
<td>21.6 (3.3)</td>
<td>17.1 (2.3)</td>
<td>0.1</td>
<td>134.3</td>
<td>4.0</td>
</tr>
<tr>
<td>Total</td>
<td>95.3 (21.8)</td>
<td>61.1 (10.8)</td>
<td>0.1</td>
<td>161.2</td>
<td>6.9</td>
</tr>
<tr>
<td><strong>Flores</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flores Timur</td>
<td>60.3 (31.1)</td>
<td>46.9 (10.3)</td>
<td>5.6</td>
<td>287.9</td>
<td>11.5</td>
</tr>
<tr>
<td>Sikka</td>
<td>108.4 (48.1)</td>
<td>32.1 (5.7)</td>
<td>-</td>
<td>189.7</td>
<td>14.5</td>
</tr>
<tr>
<td>Ende</td>
<td>51.3 (3.3)</td>
<td>12.4 (4.6)</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ngada</td>
<td>71.8 (3.3)</td>
<td>15.3 (2.2)</td>
<td>5.8</td>
<td>173.4</td>
<td>9.8</td>
</tr>
<tr>
<td>Manggarai</td>
<td>83.2 (12)</td>
<td>14.9 (0.0)</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>375.0 (87.0)</td>
<td>121.6 (22.8)</td>
<td>11.6</td>
<td>651.0</td>
<td>35.8</td>
</tr>
<tr>
<td><strong>Sumba</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sumba Barat</td>
<td>96.5 (1.2)</td>
<td>13.5 (1.7)</td>
<td>-</td>
<td>385.0</td>
<td>-</td>
</tr>
<tr>
<td>Sumba Timur</td>
<td>52.1 (24.9)</td>
<td>9.6 (13.3)</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>148.6 (26.1)</td>
<td>23.1 (15.0)</td>
<td>0.1</td>
<td>385.0</td>
<td>-</td>
</tr>
<tr>
<td>Grand total</td>
<td>1003.1 (200.6)</td>
<td>383.5 (108.3)</td>
<td>82.4</td>
<td>2401.1</td>
<td>59.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Fish harvest ('000 t)</th>
<th>Forest ('000 ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sea</td>
<td>Inland</td>
</tr>
<tr>
<td><strong>West Timor</strong></td>
<td>9.3</td>
<td>-</td>
</tr>
<tr>
<td><strong>Belu and Alor</strong></td>
<td>1.7</td>
<td>-</td>
</tr>
<tr>
<td><strong>Flores</strong></td>
<td>11.9</td>
<td>-</td>
</tr>
<tr>
<td><strong>Sumba</strong></td>
<td>32.3</td>
<td>0.1</td>
</tr>
</tbody>
</table>

**Notes:**

- `a` TTS = Timor Tengah Selatan, TTU = Timor Tengah Utara, in this and succeeding tables.
- `b` Figures in parentheses are total numbers of relevant livestock slaughtered in 1987.
- `c` In the mid-1970s.

Source: (Forestry data) Jones and Darsidi 1976; (other data) *Kantor Statistik* 1976–88.
## Table 6: Harvested areas and production of major food crops, NTT, 1975–87

<table>
<thead>
<tr>
<th>Crop</th>
<th>Harvested area ('000 ha)&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Production ('000t)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet paddy</td>
<td>{</td>
<td>58.5</td>
<td>58.8</td>
<td>{</td>
<td>133.3</td>
</tr>
<tr>
<td></td>
<td>{ 131.2</td>
<td></td>
<td></td>
<td>{</td>
<td>198.9</td>
</tr>
<tr>
<td>Dry paddy</td>
<td>{</td>
<td>89.7</td>
<td>48.9</td>
<td>{</td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td>180.7</td>
<td>229.6</td>
<td>187.7</td>
<td>139.0</td>
<td>(0.8)</td>
</tr>
<tr>
<td>Cassava</td>
<td>66.1</td>
<td>109.3</td>
<td>72.3</td>
<td>290.1</td>
<td>(4.4)</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>23.5</td>
<td>18.2</td>
<td>13.7</td>
<td>82.4</td>
<td>(3.5)</td>
</tr>
<tr>
<td>Groundnuts</td>
<td>5.5</td>
<td>8.0</td>
<td>9.7</td>
<td>17.6</td>
<td>(3.2)</td>
</tr>
<tr>
<td>Grand total&lt;sup&gt;c&lt;/sup&gt;</td>
<td>407.0</td>
<td>513.3</td>
<td>391.1</td>
<td>713.3</td>
<td>969.6</td>
</tr>
</tbody>
</table>

Notes:

<sup>a</sup> Data are thought to be incomplete.

<sup>b</sup> Figures in parentheses are average yields in tonnes per harvested hectare.

<sup>c</sup> Not including substantial areas of mungbeans and sweet potatoes. Mungbeans generally follow wet paddy in the same area, however.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Planted area ('000 ha)</th>
<th>Production ('000t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coconut</td>
<td>73.8</td>
<td>91.6</td>
</tr>
<tr>
<td>Coffee</td>
<td>13.0</td>
<td>49.9</td>
</tr>
<tr>
<td>Kapok</td>
<td>2.6c</td>
<td>38.4</td>
</tr>
<tr>
<td>Cashew</td>
<td>4.5</td>
<td>7.4</td>
</tr>
<tr>
<td>Candlenut</td>
<td>c</td>
<td>10.7</td>
</tr>
<tr>
<td>Cloves</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Cocoa</td>
<td>0.2</td>
<td>1.0</td>
</tr>
<tr>
<td>Cotton</td>
<td>0.3c</td>
<td>c</td>
</tr>
<tr>
<td>Othersd</td>
<td>c</td>
<td>1.7c</td>
</tr>
<tr>
<td><strong>Grand Totals</strong></td>
<td><strong>94.9</strong></td>
<td><strong>106.7</strong></td>
</tr>
</tbody>
</table>

Notes:

a Figures in parentheses are percentages of planted area in production.
b Figures in brackets are average yields per planted hectare.
c Data are thought to be incomplete.
d Including jarak, vanilla and pala, but not lontar which actually covers substantial areas.

### Table 8: Livestock numbers and slaughterings, NTT, 1975–87

<table>
<thead>
<tr>
<th>Animals</th>
<th>Total numbers ('000)</th>
<th>Numbers slaughtered ('000 head)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>365.5</td>
<td>413.9</td>
</tr>
<tr>
<td>Buffaloes</td>
<td>121.5</td>
<td>124.2</td>
</tr>
<tr>
<td>Horses</td>
<td>167.8</td>
<td>188.7</td>
</tr>
<tr>
<td>Goats</td>
<td>240.2</td>
<td>305.9</td>
</tr>
<tr>
<td>Pigs</td>
<td>565.0</td>
<td>656.4</td>
</tr>
<tr>
<td>Chickens</td>
<td>2,718.6</td>
<td>2,741.5</td>
</tr>
<tr>
<td>Ducks</td>
<td>31.6</td>
<td>36.1</td>
</tr>
</tbody>
</table>

Note:

* The apparent increase in numbers of buffalo in particular is subject to doubt.


### Table 9: Fish and forestry production, NTT, 1975–87

<table>
<thead>
<tr>
<th></th>
<th>1975 ('000t)</th>
<th>1980 ('000t)</th>
<th>1987 ('000t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sea</td>
<td>24.7*</td>
<td>44.0b</td>
<td>50.1</td>
</tr>
<tr>
<td>Inland</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Total</td>
<td>24.8</td>
<td>44.2</td>
<td>50.4</td>
</tr>
<tr>
<td>Forestry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timber and logs*</td>
<td>8.1</td>
<td>4.9</td>
<td>16.8</td>
</tr>
<tr>
<td>Sandalwood oil</td>
<td>n.a.</td>
<td>563</td>
<td>794</td>
</tr>
</tbody>
</table>

Notes:

* Figure refers to 1978.
* Figure refers to 1981.
* These figures are probably incomplete.

Table 10: Aspects of small farm agriculture by *kabupaten*, NTT, 1983

<table>
<thead>
<tr>
<th>Kabupaten</th>
<th>Area of land (ha)</th>
<th>Average area of farm (ha)</th>
<th>Irrigated— <em>padi</em> crop</th>
<th>Irrigated— <em>2 padi</em> crops</th>
<th>Rainfed <em>sawah</em></th>
<th>Shifting cultivation</th>
<th>Tree crops</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timor Barat</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kupang</td>
<td>50,081</td>
<td>0.9</td>
<td>12</td>
<td>3</td>
<td>9</td>
<td>69</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>TTS</td>
<td>43,355</td>
<td>0.8</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>90</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>TTF</td>
<td>26,739</td>
<td>1.0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>86</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>120,175</td>
<td>0.9</td>
<td>6</td>
<td>2</td>
<td>5</td>
<td>80</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td><strong>Belu and Alor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belu</td>
<td>40,874</td>
<td>1.2</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>84</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Alor</td>
<td>37,451</td>
<td>1.7</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>59</td>
<td>37</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>78,299</td>
<td>1.7</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>72</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td><strong>Flores Timur</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sikka</td>
<td>47,341</td>
<td>1.2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>71</td>
<td>26</td>
<td>3</td>
</tr>
<tr>
<td>Ende</td>
<td>30,067</td>
<td>1.0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>85</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Ngada</td>
<td>27,578</td>
<td>1.2</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>64</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>Manggarai</td>
<td>26,330</td>
<td>1.2</td>
<td>10</td>
<td>3</td>
<td>6</td>
<td>63</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>217,149</td>
<td>1.2</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>62</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td><strong>Sumba</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sumba Barat</td>
<td>50,905</td>
<td>1.3</td>
<td>7</td>
<td>2</td>
<td>12</td>
<td>58</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>Sumba Timur</td>
<td>26,366</td>
<td>1.3</td>
<td>10</td>
<td>1</td>
<td>19</td>
<td>67</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>77,271</td>
<td>1.3</td>
<td>8</td>
<td>2</td>
<td>14</td>
<td>61</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>492,893</td>
<td>1.2</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>68</td>
<td>16</td>
<td>2</td>
</tr>
</tbody>
</table>
Notes:

a Areas given are those 'operated' by the 419,232 'food crop' households involved. The areas 'controlled' by these households are substantially greater (see Table 16), but the extra land mainly entails scrub not currently subject to shifting cultivation.

b Operated land + households concerned.

c Including pasang surut areas.
d The proportions in this column refer to the total of 76,916 ha of estate crops reported by the food crop households specified here. But the actual total area of smallholding tree crops was far larger, amounting to over 278,000 ha in 1987 (Table 7).

e Including ponds, dykes etc.

f There was a total area of 404,000 ha under irrigated padi, rainfed sawah and shifting cultivation according to the 1983 census, and this compared with 391,000 ha under food crops in 1987 (Table 6). Some of the 1983 rainfed sawah is pasang surut, however, (note c).

Source: Biro Pusat Statistik 1986a.
Table 11: Farm size distribution by type of farming, NTT, 1983.

<table>
<thead>
<tr>
<th>Farm area size group (ha)</th>
<th>Area of land (ha)</th>
<th>% of total area of land</th>
<th>Irrigated - 1 padi crop</th>
<th>Irrigated - 2 padi crops</th>
<th>Rainfed sawah</th>
<th>Shifting cultivation</th>
<th>Tree crops</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 0.5</td>
<td>12,409</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>82</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>0.5–1.0</td>
<td>46,887</td>
<td>10</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>81</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>1.0–2.0</td>
<td>146,857</td>
<td>30</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>74</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>2.0–3.0</td>
<td>116,765</td>
<td>24</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>68</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>Above 3.0</td>
<td>169,973</td>
<td>35</td>
<td>7</td>
<td>3</td>
<td>7</td>
<td>58</td>
<td>22</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>492,893</td>
<td>100</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>68</td>
<td>16</td>
<td>2</td>
</tr>
</tbody>
</table>

Notes:

- Figures refer to land operated by 'food crop' households, although other kinds of farming are partly included (see note d of Table 10).
- Figures in brackets are total hectares of land involved.

Source: Biro Pusat Statistik (1986).
Table 12: Distribution of agricultural land, NTT, 1987 (% of households).

<table>
<thead>
<tr>
<th>Location</th>
<th>None</th>
<th>&lt;0.5</th>
<th>0.5-1.0</th>
<th>1.0-2.0</th>
<th>&gt;2.0</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timor Barat</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kupang</td>
<td>8.0</td>
<td>15.2</td>
<td>21.0</td>
<td>34.5</td>
<td>21.3</td>
<td>100.0</td>
</tr>
<tr>
<td>TTS</td>
<td>2.0</td>
<td>5.2</td>
<td>23.9</td>
<td>51.0</td>
<td>17.9</td>
<td>100.0</td>
</tr>
<tr>
<td>TTU</td>
<td>1.4</td>
<td>3.4</td>
<td>11.7</td>
<td>41.3</td>
<td>42.2</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4.5</td>
<td>9.1</td>
<td>20.5</td>
<td>42.4</td>
<td>23.5</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Belu and Alor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belu</td>
<td>1.2</td>
<td>3.9</td>
<td>16.8</td>
<td>44.3</td>
<td>33.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Alor</td>
<td>5.1</td>
<td>4.7</td>
<td>12.1</td>
<td>30.1</td>
<td>48.1</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2.7</td>
<td>4.2</td>
<td>15.0</td>
<td>39.0</td>
<td>39.2</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Flores</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flores</td>
<td>7.7</td>
<td>9.4</td>
<td>30.4</td>
<td>30.9</td>
<td>21.6</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Timur</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sikka</td>
<td>9.6</td>
<td>14.1</td>
<td>23.6</td>
<td>29.4</td>
<td>23.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Ende</td>
<td>5.2</td>
<td>16.2</td>
<td>34.4</td>
<td>30.2</td>
<td>14.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Ngada</td>
<td>2.1</td>
<td>15.3</td>
<td>19.6</td>
<td>35.3</td>
<td>27.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Manggarai</td>
<td>2.5</td>
<td>11.1</td>
<td>24.4</td>
<td>37.5</td>
<td>24.5</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>5.2</td>
<td>12.6</td>
<td>26.3</td>
<td>33.3</td>
<td>22.6</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 12 (continued)

<table>
<thead>
<tr>
<th>Location</th>
<th>None</th>
<th>&lt;0.5</th>
<th>0.5-1.0</th>
<th>1.0-2.0</th>
<th>&gt;2.0</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sumba Barat</td>
<td>0.2</td>
<td>4.5</td>
<td>18.0</td>
<td>41.8</td>
<td>38.5</td>
<td>100.0 (42.4)</td>
</tr>
<tr>
<td>Sumba Timur</td>
<td>0.8</td>
<td>5.3</td>
<td>20.4</td>
<td>49.5</td>
<td>24.0</td>
<td>100.0 (22.3)</td>
</tr>
<tr>
<td>Total</td>
<td>0.4</td>
<td>4.8</td>
<td>16.9</td>
<td>44.5</td>
<td>33.5</td>
<td>100.0 (64.7)</td>
</tr>
<tr>
<td>Grand Total</td>
<td>4.0</td>
<td>9.4</td>
<td>21.8</td>
<td>38.4</td>
<td>26.4</td>
<td>100.0 (503.0)</td>
</tr>
</tbody>
</table>

Note:
* Figures in parentheses in this column are thousands of households.

Table 13: Farm-size distribution by area of land controlled and ownership, NTT, 1983

<table>
<thead>
<tr>
<th>Farm area size group (ha)</th>
<th>Area of land (ha)</th>
<th>% of total area of land</th>
<th>% of total households involved with it</th>
<th>% of area in size group which is ownedb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 0.5</td>
<td>14,933</td>
<td>2</td>
<td>14</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>[0.25]c</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5-1.0</td>
<td>55,929</td>
<td>8</td>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>[0.61]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0-2.0</td>
<td>184,736</td>
<td>26</td>
<td>34</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>[1.23]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0-3.0</td>
<td>164,982</td>
<td>23</td>
<td>17</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>[2.18]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above 3.0</td>
<td>289,409</td>
<td>41</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>[4.42]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>709,989</td>
<td>100</td>
<td>100</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>[1.62]</td>
<td></td>
<td>[440,368]d</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

a Figures refer to areas controlled by 'food crop' households, where numbers of households are somewhat less than those in Table 12.
b Owned by the households concerned, as opposed to being 'originated from' or 'held by' other parties.
c Figures in brackets are average areas of controlled land per household.
d Total numbers of households involved.
Source: Biro Pusat Statistik (1986a).
Table 14: Distribution of monthly household income, NTT, 1987 (%)

<table>
<thead>
<tr>
<th>Monthly income ('000 Rp)</th>
<th>Town</th>
<th>Country</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 50</td>
<td>2.4</td>
<td>15.6</td>
<td>14.5</td>
</tr>
<tr>
<td>50–100</td>
<td>11.6</td>
<td>44.4</td>
<td>41.6</td>
</tr>
<tr>
<td>100–150</td>
<td>16.7</td>
<td>21.9</td>
<td>21.4</td>
</tr>
<tr>
<td>150–200</td>
<td>15.5</td>
<td>8.7</td>
<td>9.3</td>
</tr>
<tr>
<td>200 and over</td>
<td>53.8</td>
<td>9.4</td>
<td>13.2</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 15: Annual consumption of major foods, per head, NTT, 1987.

<table>
<thead>
<tr>
<th>Food</th>
<th>Town</th>
<th>Country</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice and rice products</td>
<td>112.3</td>
<td>82.9</td>
<td>85.3</td>
</tr>
<tr>
<td>Maize and maize products</td>
<td>12.5</td>
<td>60.3</td>
<td>56.2</td>
</tr>
<tr>
<td>Sweet potato and sweet potato products</td>
<td>7.3</td>
<td>48.9</td>
<td>45.2</td>
</tr>
<tr>
<td>Cassava and cassava products</td>
<td>1.0</td>
<td>7.3</td>
<td>6.8</td>
</tr>
<tr>
<td>Other root crops</td>
<td>0.5</td>
<td>2.6</td>
<td>2.6</td>
</tr>
<tr>
<td>Fish</td>
<td>16.1</td>
<td>6.7</td>
<td>8.2</td>
</tr>
<tr>
<td>Cattle and buffalo meat</td>
<td>4.2</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>Hen eggs</td>
<td>4.2</td>
<td>1.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Sugar</td>
<td>10.7</td>
<td>4.4</td>
<td>5.4</td>
</tr>
<tr>
<td>Coconuts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(No. nuts)</td>
<td>13.5</td>
<td>25.0</td>
<td>24.4</td>
</tr>
<tr>
<td>(litres)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooking oil</td>
<td>6.8</td>
<td>3.1</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Note:

* Most figures refer to kg dry weight, but some, including maize, are partially wet weight (with 80–90 per cent dry weight content).

Table 16: Details of industrial enterprises, NTT, 1986

<table>
<thead>
<tr>
<th>Industry group</th>
<th>Large and medium industries</th>
<th>Small industries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Numbers of establishments</td>
<td>Value added at market prices (in million Rp)</td>
</tr>
<tr>
<td>Food</td>
<td>3</td>
<td>105.6 (35)b</td>
</tr>
<tr>
<td>Textiles and clothing</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Wood and wood products</td>
<td>11</td>
<td>1383.1 (126)</td>
</tr>
<tr>
<td>Paper, paper products and printing</td>
<td>1</td>
<td>(119) (119)</td>
</tr>
<tr>
<td>Chemicals, oils and plastics</td>
<td>2</td>
<td>561.8 (281)</td>
</tr>
<tr>
<td>Non-metal mining equipment</td>
<td>2</td>
<td>1485.3 (743)</td>
</tr>
<tr>
<td>Metal equipment and machines</td>
<td>2</td>
<td>27.6 (14)</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>3682.1 (175)</td>
</tr>
</tbody>
</table>

Notes:

a 'Large' industries or firms are those employing 100 or more workers, while 'medium' industries are those employing 20–99 workers.

b 'Small' industries are those with 5–19 workers.

b Figures in parentheses are averages per establishment.

Table 17: International exports*, NTT, 1975–87

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Coffee</td>
<td>0.6</td>
<td>2.7</td>
<td>7.5</td>
<td>0.5</td>
<td>3.8</td>
<td>11.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandalwood products</td>
<td>0.2</td>
<td>0.9</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cocoa</td>
<td>-</td>
<td>-</td>
<td>0.6</td>
<td>-</td>
<td>-</td>
<td>0.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotton</td>
<td>-</td>
<td>-</td>
<td>1.1</td>
<td>-</td>
<td>-</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cassia Vera</td>
<td>-</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
<td>0.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Othersc</td>
<td>-</td>
<td>11.4</td>
<td>0.1</td>
<td>-</td>
<td>2.5</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td>0.8</td>
<td>14.5</td>
<td>9.7</td>
<td>2.9d</td>
<td>6.5</td>
<td>14.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
* To countries outside Indonesia.
* Nominal.
* Mainly cattle and buffalo exports.
* Including the value of fish exports, whose volume was not specified.

Table 18: Exports and imports*, NTT, 1987 (Rp million)

<table>
<thead>
<tr>
<th>Items</th>
<th>Exports</th>
<th>Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food crops excepting rice</td>
<td>8.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Tree crops</td>
<td>29.1</td>
<td>-</td>
</tr>
<tr>
<td>Livestock and livestock products</td>
<td>73.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Timber and jungle products</td>
<td>1.7</td>
<td>4.6</td>
</tr>
<tr>
<td>Fish and marine</td>
<td>19.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Mining</td>
<td>0.0</td>
<td>4.1</td>
</tr>
<tr>
<td>Food and drink, including rice and</td>
<td>0.0</td>
<td>50.9</td>
</tr>
<tr>
<td>consumer durables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other industrial products</td>
<td>2.3</td>
<td>86.6</td>
</tr>
<tr>
<td>Petroleum</td>
<td>-</td>
<td>29.9</td>
</tr>
<tr>
<td>Restaurant and hotel services</td>
<td>0.2</td>
<td>0.4</td>
</tr>
<tr>
<td>Others</td>
<td>0.3</td>
<td>2.8</td>
</tr>
<tr>
<td>Grand total</td>
<td>134.1</td>
<td>179.8</td>
</tr>
</tbody>
</table>

Note:
* Totals of international trade and 'interisland' trade with other Indonesian provinces.
Table 19: Infrastructures in NTT, 1975–87

<table>
<thead>
<tr>
<th>Item</th>
<th>1975</th>
<th>1980</th>
<th>1987</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary schools</td>
<td>2348 (345)</td>
<td>2659 (464)</td>
<td>3775 (602)</td>
</tr>
<tr>
<td>Hospitals</td>
<td>n.a.</td>
<td>24 (1516)</td>
<td>25 (1606)</td>
</tr>
<tr>
<td>Doctors</td>
<td>161</td>
<td>123</td>
<td>191</td>
</tr>
<tr>
<td>Electricity (’000 kWh)</td>
<td>n.a.</td>
<td>13,478</td>
<td>47,580</td>
</tr>
<tr>
<td>Roads:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- asphalt</td>
<td>5</td>
<td>982</td>
<td>2,803</td>
</tr>
<tr>
<td>- other</td>
<td>2,573</td>
<td>9,437</td>
<td>1,109</td>
</tr>
<tr>
<td>Vehicles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- cars and lorries</td>
<td>2,179</td>
<td>n.a.</td>
<td>10,945</td>
</tr>
<tr>
<td>- motor cycles</td>
<td>3,625</td>
<td>n.a.</td>
<td>26,359</td>
</tr>
<tr>
<td>Ship arrivals</td>
<td>n.a.</td>
<td>2,438 (477)</td>
<td>5,481 (453)</td>
</tr>
<tr>
<td>Airplane arrivals</td>
<td>n.a.</td>
<td>5,566 (548)</td>
<td>9,914 (1017)</td>
</tr>
</tbody>
</table>

Notes:

- Figures in parentheses along this line are ’000s of students.
- Figures in parentheses along this line are numbers of hospital beds.
- Figures in parentheses along this line are ’000s of tonnes unloaded.
- Figures in parentheses along this line are tonnes unloaded.

Source: Kantor Statistik (1976-88).
<table>
<thead>
<tr>
<th></th>
<th>79/80</th>
<th>80/81</th>
<th>81/82</th>
<th>82/83</th>
<th>83/84</th>
<th>84/85</th>
<th>85/86</th>
<th>86/87</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Receipts:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous year’s surplus</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.1</td>
</tr>
<tr>
<td>Local taxes</td>
<td>0.5</td>
<td>0.6</td>
<td>0.6</td>
<td>1.1</td>
<td>1.2</td>
<td>1.4</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Services</td>
<td>0.9</td>
<td>1.0</td>
<td>1.2</td>
<td>0.5</td>
<td>0.7</td>
<td>1.1</td>
<td>1.2</td>
<td>2.8</td>
</tr>
<tr>
<td>Transfers from centre</td>
<td>15.7</td>
<td>22.3</td>
<td>27.5</td>
<td>25.3</td>
<td>31.4</td>
<td>45.9</td>
<td>9.7</td>
<td>10.2</td>
</tr>
<tr>
<td>Other</td>
<td>0.8</td>
<td>0.2</td>
<td>0.8</td>
<td>0.8</td>
<td>7.9</td>
<td>0.7</td>
<td>0.7</td>
<td>0.5</td>
</tr>
<tr>
<td>Total</td>
<td>17.9</td>
<td>24.1</td>
<td>30.1</td>
<td>28.6</td>
<td>41.2</td>
<td>49.1</td>
<td>12.9</td>
<td>15.0</td>
</tr>
<tr>
<td><strong>Development</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous year’s surplus</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5.9</td>
<td>0</td>
<td>9.6</td>
<td>7.1</td>
<td>6.6</td>
</tr>
<tr>
<td>Transfers from centre</td>
<td>2.6</td>
<td>5.1</td>
<td>7.6</td>
<td>8.8</td>
<td>8.8</td>
<td>8.7</td>
<td>10.8</td>
<td>10.2</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.1</td>
</tr>
<tr>
<td>Total</td>
<td>2.6</td>
<td>5.1</td>
<td>7.6</td>
<td>14.7</td>
<td>8.8</td>
<td>18.3</td>
<td>17.9</td>
<td>16.9</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>20.5</td>
<td>29.2</td>
<td>37.7</td>
<td>43.3*</td>
<td>50.0*</td>
<td>67.4*</td>
<td>30.8*</td>
<td>31.9*</td>
</tr>
</tbody>
</table>

*NOTE: Figures in parentheses indicate percentage of total.
Table 20 (continued)

<table>
<thead>
<tr>
<th></th>
<th>79/80</th>
<th>80/81</th>
<th>81/82</th>
<th>82/83</th>
<th>83/84</th>
<th>84/85</th>
<th>85/86</th>
<th>86/87</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditures:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous year's deficit</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Personnel and pensions</td>
<td>13.8</td>
<td>21.9</td>
<td>26.8</td>
<td>22.6</td>
<td>25.8</td>
<td>31.8</td>
<td>4.3</td>
<td>6.0</td>
</tr>
<tr>
<td>Transfer to lower regions</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11.1</td>
<td>12.1</td>
<td>12.8</td>
<td>4.2</td>
<td>1.5</td>
</tr>
<tr>
<td>Other</td>
<td>3.7</td>
<td>2.1</td>
<td>3.1</td>
<td>2.5</td>
<td>3.2</td>
<td>4.5</td>
<td>4.2</td>
<td>6.5</td>
</tr>
<tr>
<td>Total</td>
<td>17.5</td>
<td>24.0</td>
<td>29.9</td>
<td>36.2</td>
<td>41.1</td>
<td>50.8</td>
<td>12.7</td>
<td>14.0</td>
</tr>
<tr>
<td>Development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction, repairs and maintenance</td>
<td>2.1</td>
<td>3.7</td>
<td>4.9</td>
<td>5.9</td>
<td>8.4</td>
<td>3.6</td>
<td>6.2</td>
<td>6.1</td>
</tr>
<tr>
<td>Other</td>
<td>0.7</td>
<td>1.6</td>
<td>2.8</td>
<td>0.7</td>
<td>0</td>
<td>4.9</td>
<td>5.1</td>
<td>10.2</td>
</tr>
<tr>
<td>Total</td>
<td>2.8</td>
<td>5.3</td>
<td>7.7</td>
<td>6.6</td>
<td>8.4</td>
<td>8.5</td>
<td>11.3</td>
<td>16.3</td>
</tr>
<tr>
<td>Grand Total</td>
<td>20.3</td>
<td>(36.8)b</td>
<td>37.6</td>
<td>42.8</td>
<td>49.5</td>
<td>59.3</td>
<td>24.0</td>
<td>30.3</td>
</tr>
</tbody>
</table>

Notes:

- Further very significant 'cash affair' receipts (and transfers from the centre) of Rp5.9 billion (1982/83), Rp13.9 billion (1983/84), Rp10.7 billion (1984/85), Rp56.5 billion (1985/86), and Rp62.8 billion (1986/87) were obtained. These were largely offset by expenditures.

- Figures in parentheses are grand totals deflated by the Jakarta CPI (1986/87 = 100).

APPENDIX II

SUMMARIZED RECOMMENDATIONS
FROM INDIVIDUAL CHAPTERS

Chapter 3: The overall conditions (pp.15–30)

1. Agricultural productivity should be improved through new crop and livestock technologies. Improved crops should be developed from widely selected genetic materials, and both they and relevant inputs should be made effectively available at village level.

2. Water supplies should be developed by appropriate methods which are within the means of communities to maintain.

3. Fisheries should be extended, chiefly by introducing medium-sized fishing vessels with upgraded cold storage facilities and some enhanced processing.

4. Tourism should be intensified, with government supplying roads and basic infrastructures, and private business providing accommodation and other facilities.

5. Downstream processing and product quality should be enhanced, notably through better finishing of live cattle and roasting and grading of coffee, but also through adding value to vegetable oils, textiles, and fish and wood products.

6. Trade should be expanded, with stronger market linkages in terms of improved business contacts and enhanced freighting arrangements.

7. Infrastructures should be upgraded, notably through better rural roads, port facilities, and health and education services.

8. Public and private agencies should be oriented more towards development. NGOs and private businesses should be encouraged to participate in development projects, and community involvement should be recognized as vital for sustainability.

Chapter 4: Land and environment (pp. 31–38)

1. Water resources should be managed very carefully. The harvesting of surplus water through various means and the more efficient use
of natural water reserves are important spheres for attention in development and aid projects.

2. The geographic history and environmental characteristics of an area should be considered before making technological inputs. Thus while bench terracing provides good results on the well-structured volcanic soils of Java and Bali, it is counterproductive on the shallow erodible soils of Timor, and a waste of scarce resources.

3. Research should be conducted into sustainable farming systems. In NTT in the foreseeable future, this means an agricultural production system without large fertilizer inputs or other artificial soil improvements, and without sophisticated mechanization.

Chapter 5: Health, education, and social services (pp. 39–50)

1. Much more human resource development (HRD) is needed in NTT, and should be properly integrated with other aspects of improvement.

2. National HRD policies should be tailored to local requirements at the regional level.

3. Employment policies and employment creation must be an integral element of HRD strategies.

4. Individuals should be stimulated through HRD policies to make appropriate personal investment decisions.

Chapter 6: Approaches to regional development (pp. 53–62)

1. Regional development efforts should take more account of socio-cultural aspects, and of the ability of regions to absorb development activities.

2. Development programmes should have a long-term aim and involve all relevant sectors and parties, including local peoples, in development.

3. Improving transport links to NTT is an important requirement for development programmes, and should help to integrate rural and urban centres of the province with outside centres like Denpasar, Surabaya, Ujang Padang, and Darwin.

4. Tourism should be further developed.

5. Livestock and crop agriculture should be improved, but with regard to environmental preservation.
Chapter 7: Regional policy In NTT (pp. 63–72)

1. Regional policy should take account of the Indonesian national context, but should recognize the great variation and fragility characterizing the environment of NTT.

2. Regional policy should cater for both spatial and sectoral dimensions, including these together in development plans. This is particularly applicable to transportation development.

3. The agricultural and tourist sectors are important to develop, and should be looked at in the joint spatial and sectoral context, with relevant marketing linkages being encouraged.

4. The idea of 'growth points' is worth bearing in mind in planning development. Here internal dynamics and culturally related factors within villages should be identified and worked with.

Chapter 8: A case study of West Sumatra (pp.73–84 )

1. It should be recognized that development policy must operate jointly in the time, space and mental development level of the communities involved.

2. The community should be wholly involved in the development process, with the three societal 'pillars' comprising the people themselves, the traditional leaders, and the intellectuals all actively taking part.

3. Social and cultural factors have to be carefully recognized if development is to be successful.

4. Government should take an active role in encouraging cooperation in development, through harnessing the participation of community leaders who people respect and follow.

5. Training of development implementers is important, and in the West Sumatran case entailed an important contribution from foreign specialists from Germany.

Chapter 9: Livestock development In NTT (pp. 85–104)

1. Long-term and systematically implemented plans which are based on accurate information and conform to an overall structure are crucial in effective development. Often this is not recognized, with disastrous results.
2. In formulating such policies for livestock, resource levels, including the feed resource base and labour availability, have to be carefully assessed.

3. The distribution of ownership is also a crucial factor, where the lopsided ownership of cattle in NTT has important implications for policy and should thus involve cattle redistribution.

4. Subsistence livestock activities are important, where poultry in particular are vital for this and Newcastle Disease control through oral vaccine is a key avenue to follow.

5. Cattle support policies should be built on improving Bali cattle, distribution of big herds to intensive feed management by individuals, and feed improvement. Farming systems research can help to inform such policies.

Chapter 10: New forage technologies (pp. 105–120)

1. Further forage improvement in NTT is essential to support increases in cattle production and wood supply, and to prevent land degradation.

2. Much information about forages has already been collected through research and should be actively used, but better forage legumes still have to be developed.

3. The extension arm of forage development is crucial, so that local people can appreciate what is available and use it to their own advantage.

4. Projects like that of dryland forage improvement at Besi Pae, TTS, are of major value, and should be further promoted.

Chapter 11: Food crops development In NTT (pp. 121–143)

1. Farming systems research is important in enabling the identification of appropriate new food crop technologies and their place in the farming system. Social aspects have to be carefully considered in this.

2. Both ‘low input’ and ‘high input’ systems should be looked at in improvement, but the latter involves a significant improvement in capacity to supply local inputs as well as markets for the resulting production.
3. Multiple cropping improvements and cultivation adjustments are promising ways of improvement under the low input system, and are probably most pertinent at this stage.

4. Donor assistance to government agencies, including the *Kanwil Pertanian* and the Agency for Agricultural Research and Development (*Litbang Pertanian*) is crucial for promoting the developments suggested.

**Chapter 12: Industry In NTT (pp. 145–153)**

1. Development of industry in NTT must recognize the weak infrastructures, small and scattered markets, high wages and low skills. Lack of entrepreneurship, low productivity, undeveloped capital markets, and traditional reliance on mainland inputs and processing.

2. Special potentials for development exist in processing fish products, coffee, cocoa, sugar, salt and extending in weaving and handicrafts.

**Chapter 13: Tourism in the development of NTT (pp. 155–164)**

1. Tourism development needs basic infrastructures in transport facilities, electricity and water, with supporting facilities of information, accommodation, and tour organization. The government should provide the infrastructures, and the private sector the other facilities.

2. New resorts and facilities should be developed with an eye to attracting tourists from Bali and Darwin in particular.

3. Training of tourist operators, familiarization of local peoples with tourists, and the promotion of the NTT in outside markets are important aspects for government in addition to supplying infrastructure requirements.

**Chapter 14: Markets of central Timor (pp.165–177)**

(A description of how markets serve principally as centres for distributing manufactured and imported goods to villages. There are no recommendations in this chapter).
Chapter 15: The implementation of regional development programmes (PPW) in NTT (pp.181–193)

1. Regional development programmes supported by foreign aid can be effectively used for specific activities, and to reduce imbalances between sectors.

2. The PDP II, NTASP and NTIADP projects have been undermined by technical, socio-cultural, funding, and reporting problems, and future projects should recognize these deficiencies and try to overcome them.

3. In future, regional development programmes should be thoroughly prepared before implementation, and have properly trained staff, coordinated planning and implementation, carefully focused activities with full recognition of area linkages, and longer-term involvement with proper community participation.

Chapter 16: The role of LSM/LPSM (NGOs) (pp.195–199)

1. NGOs, of which there are many in NTT, are a useful means of enhancing communities' abilities and initiatives in solving their own problems.

2. NGOs can be used for stimulating production activities, training, conservation, and improving water supplies.

3. NGOs must overcome several common problems, including inadequate initial funding levels, a propensity to encourage inappropriate products without markets, insufficient skills and top-heavy administration within their own organization, and a failure to cooperate with other organizations in the same field.

4. More information is required by NGOs and other development agencies about possibilities in development and about marketing opportunities. This could entail setting up an information centre in NTT.

Chapter 17: The NTIADP and NTASP schemes (pp. 201–213)

1. The planning of NTIADP and similar schemes was inadequate, and in future should involve an initial phase of some two years during which targetted plans are defined and areas of integration with various agencies set out.
2. While planning should be integrated, implementation should be sequential with particular villages and problems being tackled in turn, and with approaches being modified according to evolving experience.

3. Physical and qualitative monitoring of schemes should be ongoing.

4. A longer time-frame than five years should be used for planning and implementation of development in NTT. Long-term programmes rather than projects should be the overall focus.

5. Projects should be implemented through existing government structures, and be consistent with their long-term capabilities.

6. Technology must be modified for application at the relevant local level, and while this may sometimes involve research, it is usually possible on the basis of best guesses.

Chapter 18: AIDAB’s approach to NTT development (pp.215-221)

1. AIDAB favours concentrating on the eastern Islands of Indonesia because they are poor, similar in climate to dry parts of Australia which has relevant agricultural expertise, and in being close neighbours offer possibilities of commercial and other contacts. The region has also until recently been neglected by other donors.

2. AIDAB is looking for another but somewhat smaller project to NTTIADP, based on the IAD processes developed in that scheme and to be implemented in either NTT or elsewhere in the eastern Islands. This new project would be more focused on particular components of development.

3. AIDAB would want to capitalize on present Australian activities in NTT, and its ongoing projects will anyhow ensure continuing Australian presence for some time. It is recognized that there are opportunities for useful collaboration between projects.

Chapter 19: Tentative routes towards the development of NTT (pp.223-229)

1. A long-term framework for NTT development is required, and should involve more orientation towards exploiting marine resources, greater complementarity between ladang cultivation and animal husbandry, and the establishment of more perennial crops to meet fodder, food, firewood, and cash needs.
2. The reasons for the limited impact of integrated agricultural development projects on local communities need to be investigated.

3. Many tree crops including the lontar palm have good potential, and should be exploited and looked after more carefully.

Chapter 20: Conclusions and recommendations (pp.231–241)

1. More intensive development has often involved divergencies between the 'private' viewpoint of individuals and 'public' viewpoint of society, and government intervention is necessary to bridge these.

2. Government and foreign development projects have had useful impacts, but have also encountered important difficulties which should be allowed for in future interventions. In general, foreign projects should be more carefully planned and smaller with clearer thrusts, be better integrated both with the government structure and local communities, and have longer-term horizons.

3. Irreconcilability exists between the integrated approaches suggested by some authors, and the decentralized local initiative-taking proposed by others. This conflict must be faced in future development, and NGOs have a role in bridging the gap.

4. Private businesses should also have a key part in development, but both these and the NGOs need to be monitored by Bappeda and other authorities.

5. 'Low-input' new techniques that allow farmers to make a progressive move 'upwards' to higher skills and returns are the preferred approach in introducing new technologies.

6. Further infrastructure development is crucial, but both social and other infrastructures, be tailored more closely to particular local conditions.

7. There is a broad consensus in the book on sectoral activities, and the recommendations made (see above) should be followed up in developing new policies.
APPENDIX III

PRIORITIZED RECOMMENDATIONS

[FROM DEVELOPMENT IN INDONESIA: THE CASE OF NUSA TENGGARA TIMUR]

These recommendations are drawn from a report on NTT development by Barlow et al. (1990), and the page numbers quoted below refer to that publication.

Each recommendation is classed as (1), (2), or (3), according to its assessed priority. The sequence of the recommendations is not significant, except insofar as it follows the treatment of issues as they occur in above report.

The recommendations are as follows:

A. Selection of better seeds for maize, dry paddy, forage shrubs, and grasses (p.44)
   (a) Include sources other than Khon Khaen and AVRDC for selections at Malang. (2)
   (b) Screen seeds in relevant environments. Set up appropriate screening areas in NTT. (1)
   (c) Improve seed certification procedures, with more authority and capacity being given to the certification office at Kupang. (2)

B. Multiplication and distribution of better seeds for wet and dry paddy, maize, groundnuts, mungbean, soybean, coconut, coffee, cocoa, cloves, forage shrubs and major grasses (p.45)
   (a) Improve existing kabupaten multiplication units for food crops, and arrange distribution of seed from these to progressive farmers. (1)
(b) Set up multiplication units/nurseries in each main growing location for forage shrubs, grasses, coffee, cocoa and cloves.  
(2)

(c) Set up multiplication units/nurseries in each main growing location for coconuts, cashew, and selected fruit trees.  
(3)

(d) Reduce work on cotton.  
(1)

C. Cattle improvement (p.47)

(a) Redistribute selected bulls and heifers to smallholders without stock, but having access to forage.  
(1)

(b) Castrate inferior males and cull poor females. Remove official prohibition on slaughtering females below 8 years.  
(2)

(c) Strengthen anthrax and septicaemia vaccination programs.  
(1)

(d) Remove current restrictions on slaughter and export of underaged females.  
(1)

(e) Reassess artificial insemination program.  
(2)

D. Poultry improvement (p.47)

(a) Vaccinate against Newcastle Disease.  
(1)

E. Crop and animal husbandry development (p.58)

(a) Strengthen existing research stations (sub-balai) and associated farming system sites, with the goal of developing crop, forage and animal husbandry techniques and producing appropriate recommendation packages for each relevant agro-climatic area.  
(1)

(b) Add further farming system sites to get proper coverage of all major agro-climatic zones, including tree crops and cattle as well as food crops in the trials.  
(2)
(c) Set up Besi Pae again as a sub-balai to study farming systems based around extensive livestock, including the provision of better water supplies.

(3)

F. Water supply improvement (p.48)

(a) Enhance water supplies through wells, catchments, captured springs, tanks and dams as appropriate, with emphasis on local participation and local ability to maintain these improvements subsequently.

(1)

G. Conservation (p.49)

(a) Continue forest rehabilitation in key watershed areas.

(3)

(b) Encourage (but do not finance) resettlement from remote degraded locations to more suitable places.

(2)

(Note that the main proposed route to conservation is through intensification of farming in better locations, rather than conservation per se.)

H. Fisheries improvement (p.51)

(a) Encourage further expansion of integrated fishing arrangements based on major ports, using PIR-type structure to facilitate financing, introduction of new technologies, and links to consuming markets.

(1)

(b) Explore possibilities of joint ventures with foreign interests to expedite item H (a).

(2)

(Note that recommendations concerning fisheries extension service to individual fisherpersons, and concerning fisheries infrastructure improvements, are included below.)

I. Tourism development (p.53)

(a) Encourage private business, sometimes as joint ventures with foreign interests, to expand investment in international-standard hotels and facilities (p.92).

(1)
(Note that tourism infrastructure improvements are dealt with below.)

J. **Product quality and downstream processing (p.55)**

(a) Encourage private business to improve and expand quality and processing in fisheries and coffee, and NGOs to do the same in handwoven textiles.

(b) Encourage private business to explore possibilities of downstream processing and quality improvement with fruits, honey and other minor crops.

(c) Encourage cattle-marketing firms to tighten up and improve live cattle grading.

K. **Enhancing infrastructures (p.57)**

(a) Upgrade and establish fisheries infrastructures at main ports.

(b) Improve selected airport and road infrastructures to assist tourism.

(c) Upgrade trunk roads between major centres, and build all-weather bridges along key connecting roads.

(d) Upgrade tracks around selected villages, using NGOs and local people to help implement these programmes.

(e) Enhance health centre facilities and training of associated staff.

(f) Upgrade existing irrigation systems.

(g) Establish new irrigation systems in appropriate areas.

L. **Improving education (p.56)**

(a) Enhance primary school facilities and associated staff, including training of the latter.
(b) Establish more vocational schools, especially SMA, to serve key needs in economic development including agriculture, engineering, health and tourism. Provide and train relevant staff.

(1)

(c) Enhance and train staff at Nusa Cendana University and Kupang Polytechnic so that professionals for agriculture, engineering and health can be produced.

(2)

M. Reorienting public institutions (p.60)

(a) Cut back government programs to sustainable levels, and rationalize each program for maximum efficiency.

(1)

(b) Strengthen relationships with traditional village institutions, and also with NGOs (see further note N(a)] below), attempting at the same time to increase participation of women in various development programmes.

(1)

(c) Strengthen agricultural extension, and improve its links with Litbang Pertanian research.

(1)

(d) Strengthen fisheries extension for small 'traditional' fisherpersons.

(1)

(e) Extend kupedes system for production credit, locating offices at many more places throughout the province.

(2)

(f) Emphasize integrated area development, where the activities of public and private parties are coordinated.

(1)

(g) Strengthen Bappeda, so that it can more adequately fulfil its planning, coordinating and monitoring role.

(1)

N. Reorienting private institutions (p.60)

(a) Harness NGOs more widely, both as coordinators of small independent village-level projects, and as agents to implement parts of larger official projects.

(1)
(b) Encourage private businesses to enhance services to small producers, including short-term credit. Attempt to increase competition between separate businesses in these spheres.

(1)

(c) Encourage private businesses to use the PIR framework in stimulating the production and marketing of cocoa and soybeans, with the aim of capturing advantages in financing, in the introduction of new technologies, and in links to consuming markets.

(2)

O. Improving background information (p.61)

(a) Conduct environmental classification studies of all major provincial areas, with base data being collected on soils, topography, ground water supplies, rainfall, drainage, temperatures and solar radiation.

(1)

(b) Undertake comprehensive socio-economic studies, including household situations, production, processing and marketing.

(2)

(c) Establish central data base in Bappeda.

(3)
REFERENCES


References


____, 1987a. *Statistik harga perdagangan besar beberapa provinsi di Indonesia* [Statistics of main trading prices in several Indonesian provinces], Jakarta.


Bray, E., 1987. Section on extension techniques in Ayre-Smith *et al*.


Carson, B.R., 1979. Use of the universal soil loss equation to predict erosion of the Timorese landscape, University of British Colombia, Vancouver.

Chapman, K.R., 1986. ‘Tree crops for Timor Tengah Selatan (TTS) and Timor Tengah Utara (TTU) in Timor Barat (W. Timor)’, NTTIADP, Kupang.


Indonesia, 1986–87. *Nota keuangan dan rancangan anggaran pendapatan dan belanja negara* [Financial note on planned total national income and expenditure], Jakarta.


----, 1988, *Garis garis besar haluan negara* [Broad guidelines to state policy], Jakarta.


Kantor Wilayah Departemen Pertanian, 1989. Kajian: Inventarisasi potensi wilayah untuk menunjang pemilahan komoditi pertanian di propinsi Nusa Tenggara Timur [Inventory of local potential for raising the production of agricultural commodities in the Province of East Nusa Tenggara], Kupang.


References 283


References


Supandhi, W., 1989. Laporan Pelaksanaan Survey Pasar [Report on the implementation of the local market survey], Dinas Pertanian, Kefamenanu.

Susetio, O., 1990. 'Kaitan keodean sosial ekonomi dengan status gizi dan status kesehatan' [The connection of the socio-economic situation to nutritional and health statuses], in Gondowarsito and Soendoro (eds.), pp. 125–152.


INDEX

Aceh 55
(See also Agriculture; Livestock development; Horticulture; Integrated area development; Development projects)
Agency for Agricultural Research and Development 134, 141
agro-forestry. (See Natural resources: forests)
appropriate technology 141, 121, 202, 234, 238
constraints 59
cotton 209
food crops 121, 197
Pewilayan Pertanian 140
possibilities 226–228
Agricultural projects
NTASP 4, 5, 103, 134, 139, 141, 185, 186–187, 201–213, 207–210, 212–213, 234
Farming Systems Component 209, 211
review 208–210
NTT Livestock Development Project 202, 212–213, 218–220
pilot projects 79
Agricultural research 121, 123, 143, 185, 201, 238
aid projects 141
cotton 209
farming systems 103–104, 209, 211
Agricultural technology 103–104, 187, 121, 232, 233
conservation farming 34, 89
training and extension 103, 114–120, 186, 187, 188, 225–226, 238, 239
Agriculture 68
Bimas extension system 142
cashcrops 229, 240
composition 15, 17, 64
contribution to economy 8, 121–123, 145
crop failure 124, 137–139
crop improvement 108, 134
fertilizers 136–137, 140
cropping systems 134, 142
dairy production 89
determinants affecting production 123–127
drought 124
labour availability 125–126
pests and diseases 126–127, 131–132
rainfall 123–124
determinate crops 124
Dinas Pertanian 116, 119, 142
Dinas Peternakan 115, 116, 117, 119, 203–204
dryland cultivation 65, 197, 225
extension services 103, 104, 114–120 (See also Agricultural technology: training and extension)
farming systems 64, 65, 89, 109, 116, 117–118, 121, 136, 140, 143, 201, 202, 209, 211
food cropping systems 121
dry seedbed 137–139
Gogorencah system 137
high input/low input 134–139
ijon system 133
rencah system 131
food crops 17, 123, 224, 225, 240
cereals 130
contribution to RGDP 123
cultivation methods 126, 128–129, 130–131
development prospects 134–140
grain legumes 129–130
in cash economy 123, 224
land availability 140–141
pests and diseases 126
rice 121–123, 130–132, 137–139
rice varieties 130–131, 139
tubers 128–129
upland crops 127–129
yields 225, 137–139
food production 61, 197 (See also Horticulture)
forage (See Forage; Forage improvement; Forage technology)
government assistance 141–142, 232
indeterminate crops 124
intensification 61–62, 224
irrigation systems 118, 131, 202
Kanwil Pertanian 103, 104, 141, 203–204
labour absorption 8
labour force 47
land tenure 140
land settlement 66
sharecropping 140–141
legumes 88–89, 129–130. (See also Forage)
livestock 61, 90, 225 (See also Livestock development)
pig production 92–93
livestock grazing systems 105. (See also Forage)
pastures 105, 106, 117, 118
livestock ownership 90–93, 114
maize 121, 123, 124, 126, 127–128, 134–135, 225
maize varieties 127
market development 142 (See also Markets)
*palawija* crops 61
peanuts 129, 135
pilot projects 224–225 (See also Agricultural projects)
productivity 61–62, 188–189, 225
role of women 89
seed supply 142
small-scale agriculture 60, 64
soil types 125, 131
tree crops 17, 37, 136, 205, 224, 228
upland crops 134–137
**AIDAB**—Indonesia programme 215–221
activities in NTT 217–221
aspects 215
funding 215, 219–220
future prospects 220, 221
geographical focus 216–217
overall strategy 216–217
Australia, relations with 1–3, 217
Australian aid 3, 120, 196, 201, 226. (See also AIDAB—Indonesia programme)
AIDAB 201, 204, 207, 208, 211–212
AIDAB development policy 219, 220
Australian National University 68, 145

Bali 34, 55
Banda Arc islands 33, 34

Central Timor 165–177 (See also TTS, TTU)

Climate and topography 1–3, 20, 31–32, 63–64, 123–127, 125, 225, 231
drought 32
effect on food production 31, 233
rainfall 20, 31, 31–32, 123–124, 128
seasonality 31
variation 21

Commerce and trade
entrepreneurship 97–98, 149, 150, 196, 232 (See also Markets)
Community development 23, 78, 81, 97–98, 197, 202, 203, 212
cooperatives—KUD 196, 199
role of LSM/LPSM 195

Denpasar 62
Development administration
*Bangda* 212
*Bangdes* 203–204, 205
*Bappeda* 203–204, 205, 206, 212, 213
*Bappenas* 60, 183, 220
‘external interventions’, 4
monitoring and evaluation 78, 189, 190, 206, 209, 213
planning and coordination 78, 80–81, 86 186–187, 189, 190, 192, 202, 204, 206, 212, 212–213, 219–220, 236 (See also PPW: planning and coordination)
in agriculture 141
institutional arrangements 236–237
policy recommendations 237–239
research 82
sectoral thrusts 239–240
meetings 77–78
project management 187, 189, 190, 192, 213, 234
project implementation 212–213
(See also PPW: implementation)
Project Implementation Unit (PIU) 187, 189
staff recruitment 75, 76
staff training and development 75, 78–79, 80, 81–82, 186, 191, 192, 198, 206
UDKP [District Unit] 192
Development concepts 73–74
agro-complex 68
daerah 63
Pancasila 96
wilayah 63
Development constraints 59–60, 202
(See also Agricultural development: constraints)
climate 63–64
geographical and economic isolation 59, 231
high transport costs 59
water shortage 32
Development funding 75, 81, 182, 185, 186, 219–220, 234
AIDAB 185, 201, 215 (See also Australia, relations with: Australian aid)
*Bank Pembangunan Daerah* (the Regional Development Bank) 79
distribution 60
*Inpres* 182, 183
loans 185
NGO funding 198
Development projects (See also Agricultural projects; Integrated area development; PPW)
changes to technology 210–211, 238
impact on AIDAB’s development policy 211–212
impact on other donors 212
priority areas 211
problems of 234
Development research 1, 199, 208
(See also Agricultural research; Forage technology)
Development strategy 75–78, 86 (See also Development concepts; Regional policy)
approaches 80, 184, 209, 236
project vs institutional development 202
projects vs programmes 203
technology transfer 3
GBHN (Broad Guidelines of State Policy) 75, 80
government apparatus 76–78
inventory of problems 75–76
*Repelita* 7, 80, 81, 182
*Repelita I* 183
*Repelita II* 53, 183–184
*Repelita IV* 8–9, 68, 145, 181
*Repelita V* 7, 8, 9, 53, 60, 96, 155, 181, 237
*Repelita VI* 7, 8, 9, 181
role of social leaders 76, 77
sustainable development 201–202

Economic development (See also Regional development; Regional policy)
variations between islands 53–54

Economic growth 15, 55, 64–65
annual rate 8
high growth areas 54–55, 56
low growth areas 54–55, 56
provincial variations 183

Economy
domestic market 54, 150 (See also Commerce and trade; Markets)
market linkages 22
imports and exports  17, 150 (See also Industries)
income, per capita  8–9, 15, 54, 55, 59, 181
income, rural  61, 90, 181, 186
labour and employment  150
  high growth 60 (See also Human resources development)
overvalued rupiah  54
rural  188
structure  8
subsistence 232
unemployment  8

Education  208 (See also Human resources development: education)
enrolment ratio  56
private expenditure in  46
quality  42

Environment and conservation. (See Natural resources)

Flores  5, 21, 22, 23, 33, 66, 94, 100–101, 124, 125, 140–141, 170, 209
Acessesa  66
Alor  33, 125, 184
East  185, 229
Ende  69, 196, 197, 229
Lembor  131, 185, 186–187, 190
Manggarai  67, 130, 131, 185, 196
Maumere  197
Ngada  66, 196
Sikka  105, 109, 118, 185, 196, 229
West Flores  123–124
Forage  105–120, 240. (See also Agriculture: livestock grazing systems; Horticulture)
leucaena 106
legumes  106
Lamtoro  88–89
psyllid infestation  106, 118
Sesbania  111, 112, 114
species and varieties  105, 109–111, 117
tropical  106
Forage improvement  106–109, 118
fertilizers  112
sowing time  111–112, 117
Forage technology  105–120, 109–115
chemical composition  113
crop rotations  113–114
establishment methods  110–111
legume inoculation  110
research  109, 116
Foreign aid  5, 184, 226, 234
aid projects  5, 37
Asian Development Bank  5
Australian aid (See Australia, relations with)
CIDA and ADB  139
IBRD (World Bank)  185, 201
IGGI  215
project research  37, 185 (See also Agricultural research; Development research)
United States  5
USAID  141, 183–184, 184–185, 227, 234
West Germany  78–80
World Bank  141, 208

Geography
remoteness  20, 22, 231
Government  78–79 (See also Development administration; Provincial government; Regional policy)
decentralization  71, 184, 206, 208, 209, 212. (See also Regional policy)
Kabupaten  79, 185
kecamatan  78, 192
MPR–RI (People’s Consultative Assembly)  75
UDKP [District Unit]  192

Health (See Social development)
Horticulture  132, 139–141 (See also Agriculture; Agricultural development; Forage; Forage development)
fruits 224
   bananas and papaya 132
   *lontar* 224
fruits—commercial 132, 140
high input 140
low input 139–140
market opportunities 133
pests and diseases 133
vegetables 132, 133, 140
   garlic and onions 132–133
Human resources development 9, 39
   40, 43, 46, 47, 50, 188, 233 (See also Social development)
and national development 46
education 43, 50, 61
employment opportunities 47–48,
   50, 196
employment policy 47
intra-province variation 44
multi-sectoral aspects 50
strategy 47

Industrial development
cement and cotton 145, 146
problems and obstacles 145
prospects 151
Industries 54, 145
   background information 145–146
coal and cement 81, 82
coconut oil 148
coffee and cocoa processing 151
competition in international mar-
   kets 54
contribution to RGDP 145
food processing 152
forest products 81
growth indicators 146
   infrastructure 149
labour force 150
manufacture and processing 71
markets 150
medium-sized 146
oil refining 152
palm sugar 148
printing and publishing 149
problems and obstacles 149–150
processing 149
raw materials 145
small-scale 145, 196
technology 150
tinned fish 151
weaving and handicrafts 146–
   148, 151, 153, 240
Infrastructure 17, 20, 21, 22,
   73, 74, 81, 156, 162, 164, 203,
   205, 207, 233, 239
agricultural 188, 211
roads 62, 68
rural 188
shipping ports 67
   transportation 149
   transportation planning 66
Institutional development 207, 209
Integrated area development (IAD) 4,
   201, 236. (See also Agricultural
   projects; Development projects; PPW)
new projects 205–206
NTTIADP 4, 5, 115, 119, 185–
   186, 186–187, 201–213, 234
   background 202–203
   components 203–205, 205
   impact and results 205–208
   Mid Term Review 115–118, 119–
   120, 204, 219–221
   project design 202, 204–205
   time frame 203
    Provincial Area Development Project
   (PDP) 5, 183–187, 227–228, 234
Irian Jaya 56

Jakarta 54, 54–55
Java 34, 53, 54, 55, 89, 90, 93,
   99, 133, 231
Bogor 102
Bojonegoro 224
Madura 67, 224
Kalimantan 53
   East Kalimantan 54
Labour and employment. (See Economy:
   labour and employment; Human
   resources development)
Land. See Natural resources
Land use and management 34–36
approaches for sustainable production 36–37
overgrazing 105, 108, 114, 116, 117, 226
regulation 37, 226
soil conservation 36
soil erosion 34, 36, 37
Livestock development 4, 85–104, 186, 207. (See also Agriculture: livestock)
appropriate technology 98–99, 103–104
artificial breeding 101–104
cattle 210
disease control 101–104
feed resources 87–88, 93–94, 101–104
goat production 102–104
Indonesia–Australia Livestock Development Project 109
labour resources 89
pig production 92–93, 102–104
planning 85, 86, 89, 94–96, 99–100, 104
population data 90
poultry 93, 102–104, 116
rangeland management 93–94, 101–104
resources 86–90, 94
use of resource data 87, 95
strategy 94–100
livestock distribution 96
private sector involvement 96–100
programmes and projects 94–96
techniques 86, 96–98, 103–104
LSM/LPSM. (See Non-government organizations)
Maluku 58
Markets 165–177 (See also Commerce and trade: entrepreneurship; Horticulture: markets; Industries: markets)
Bugis traders 171
buying habits 174
Chinese traders 171
description of 166–172
large-scale traders 171–174
prices 175–177
tobacco traders 170–171
uses of 172
roads and transport system 167
Mercu Buana University 1, 68145
Natural resources
conservation 64, 196
development 9, 61, 221
agro-forestry 37
environmental management 9, 36–37
bench terracing 34
environmental variation 33
forests 17, 34, 221
géomorphology 32, 32–34, 33, 34
uplifted islands 33
volcanic islands 34
marine resources 17, 223
oil and gas 53
soil conservation 36
vegetation types 34
water 32
Non-government organizations 97–98, 183, 195–199, 237, 239
impact on communities 197–198
LSM/LPSM 183, 193, 195–199
activities 195–197
problems and obstacles 198
relationship with government 198
NTB (Nusa Tenggara Barat) 58
Nusa Cendana 47
Nusa Cendana Polytechnic 47–49
Nusa Tenggara Barat (NTB) 185
Political history
G30S/PKI rebellion 74–75
Japanese occupation 74
struggle against the Dutch 74
Population 82
growth 60
rural 61
transmigration 58, 61
Provincial government 82
Bangdes 199
Bappeda 50, 76–78, 82, 187
budget 40
Pemda 75, 76, 77
PPW 181–193
concepts and objectives 183–184, 186
impacts 188–189
implementation 190, 191
planning and coordination 186–187, 189–190, 191
problems 189–190
recommendations for improvement 191–192
types and activities 184–186, 187, 187–188

Regional development 53–62, 63, 73–74, 155 (See also Agricultural development; PPW; Regional policy)
Basic Working Developmental Unit (UDKP) 71
central government policy 60
constitutional basis 63
ecological basis 63–64
effective distribution 65
GEMPAR 199
institutional setting 70, 183, 187
limits to social expenditure 46
objectives 53
planning 53, 69, 78, 80
Bappeda 103, 187
provincial variations 73
Regional Development Unit 234
regional integration 67, 71, 204
typology 54–59
urban–village linkage 68–69
programmes. (See PPW)
Regional government. (See Provincial government)
Regional policy 63–72
constitutional basis 63
ecological setting 63
spatial and sectoral issues 65
Riau 54
Rote 33, 125, 224, 228
Rural development 188
credit assistance 79
orientation 81, 181
projects 81, 185
village development 70

Savu 33, 125, 196, 224, 228
Social development 39–50, 58, 189, 196, 199 (see also Human resources development)
as public investment 47
basic needs 189, 201–202
health and education 39, 40, 42, 47, 233, 239
health services improvements 188, 196
limitations to 46
living standards 156
role of NGOS 195–199
socio-cultural change 198–199
Social structure 20, 22–23, 60, 231
cendikiawan 76
local leaders 23
tradition 22
ulama 75
Socio-economic conditions 15–30 (See also Social development)
health and education 21, 22
income distribution 64–65 (See also Economy: income)
infant mortality 40, 44, 48, 56
key features 20–23
life expectancy 44
living standards 40, 44, 74, 181, 201, 231
poverty 5, 20, 53, 56, 58, 59, 184
rural 182
socio-economic potential 199
water supplies 21

Sulawesi 56, 58, 97–98
Sumatra 53, 90
North Sumatra 54, 54–55
Pasaman 79
South Sumatra 54, 54–55
West Sumatra 55, 75, 76
history of development 82–83
population and topography 82
Sumba 21, 22, 23, 33, 60, 94, 123–124, 125, 131, 196
East 67, 87, 101, 196, 204, 213
West 67, 185
Surabaya 62, 150

Timor Barat (West Timor) 5, 90, 93–
Amarasi 105, 109, 113, 118
Belu 184, 185, 224, 228
Kupang 44, 68, 88, 129, 132,
     133, 137, 156, 177, 196, 197
Tourism 61, 68, 82, 155, 240
    background information 155
    facilities and training 159, 162
    infrastructure 158, 162, 164
    tourist attractions 157, 158
Tourism development 155
    community awareness 160, 161
potentials 156, 163
problems 161
programmes 162–163
promotion 161, 163
research 163
Tourism Development Master
    Plan 157
tourist needs 156
TTS (South Central Timor) 68, 124,
    165, 167, 172–177, 185, 201
Besi Pae 100–101, 113, 117, 119–
    120, 185, 202, 224–225, 226–
    227, 227
This volume is a compilation of papers presented at two 1989 meetings on Nusa Tenggara Timur (NTT), one in Canberra and one in Kupang. NTT is one of the poorest provinces in Indonesia, which nonetheless has much untapped potential for socio-economic development.

The papers represent a range of perspectives and disciplinary approaches. They cover discussions on the important economic sectors in NTT, as well as issues concerning social life and the environment. Those dealing with economics provide background information on the current situation, as well as pinpointing areas for further attention and potential for further expansion. Certain development programs in NTT are surveyed, and their impacts assessed. Regional development issues are also discussed.

Overall, the volume presents development issues specific to the region, as well as contributing to the discussion of more general issues of development. It represents a dialogue between Indonesian and Australian planners, researchers, and implementers of development in NTT, and will hopefully give impetus to ongoing cooperation and commitment to development in NTT.

Department of Political and Social Change
Research School Pacific Studies
GPO Box 4, Canberra ACT 2601

ISBN 0 7315 1122 0
ISSN 0727-5994