



Environment and Reconstruction in Aceh: Two years after the tsunami



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*The Director, DCPI
United Nations Environment Programme
PO Box 30552, Nairobi, Kenya
Tel: +254 (0)20 762 1234
Fax: +254 (0)20 762 3927
E-mail: uneppub@unep.org
Web: <http://www.unep.org>*

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List of Abbreviations

ADB	Asian Development Bank
BGR	German Federal Institute for Geosciences and Natural Resources
BRR	Badan Rehabilitasi dan Rekonstruksi
EIA	Environmental Impact Assessment
FAO	Food and Agriculture Organization of the United Nations
FP	United Nations Population Fund
GIS	Geographical Information System
GTZ-SLGSR	Deutsche Gesellschaft für Technische Zusammenarbeit-Support for Local Governance for Sustainable Reconstruction
KLH	Kementerian Lingkungan Hidup
IUCN	World Conservation Union
MDF	Multi-Donor Fund for Aceh and Nias
MPA	Marine Protected Area
NAD	Nanggröe Aceh Darussalam
NGO	Non-governmental organisation
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
SEF	Strategic Environmental Framework
TRWMP	Tsunami Recovery Waste Management Programme
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID-ESP	United States Agency for International Development - Environmental Services Program
WB	World Bank
WHO	World Health Organization

Executive Summary

Overview

This report assesses environmental conditions in Indonesia's Nanggröe Aceh Darussalam province (Aceh) and Nias, in the province of North Sumatra, two years after the tsunami that occurred in the Indian Ocean on 26 December 2004. The report arrives at a pivotal moment, as the reconstruction process is being re-evaluated from a number of critical perspectives.

In retrospect, it is clear that environmental concerns were not sufficiently incorporated into strategic planning at the outset of the reconstruction process, and that as a result, reconstruction efforts have contributed to further degradation of Aceh's environment in the months since the tsunami. This report identifies the key issues and provides recommendations to strengthen reconstruction efforts, help the region achieve sustainable development and reduce risks from future potential disasters.

This document is divided into three chapters. The first analyses 'green' issues related to ecosystems and biodiversity; the second focuses on the 'brown' issues linked to human development and infrastructure; and the third examines the region's institutional capacity to implement environmental reconstruction and recovery. In addition to the findings, the report contains a series of recommendations and – as annexes – specific project concepts.

The green assessment: ecosystem and biodiversity health

The green assessment team identified three major areas of interest.

Leuser-Ulu Masen Ecosystem endangered. The Leuser-Ulu Masen ecosystem is the largest and most intact natural forest area and biodiversity resource surviving in Sumatra, and one of the most important such reserves in the world. These forests, which have been classified as having maximum environmental sensitivity, safeguard environmental

services that sustain lives and livelihoods throughout Aceh. Given that approximately 60 percent of the land in Aceh is under natural forest in the Leuser-Ulu Masen ecosystem, an average of 0.6 ha of land per person remains, only slightly more than the 0.4 ha per person that was farmed before the tsunami. However, significant damage to the forests would expose people in Aceh to hardships that are all too familiar elsewhere in Indonesia: increasingly erratic water supplies, increasing vulnerability to flash flooding and landslides, increasing erosion and siltation of downstream irrigation and drainage channels, as well as silt deposition on coral reefs that would diminish the productivity of fisheries. Such damage would sacrifice biodiversity resources that are of great potential financial value to the people of Aceh. The key concern is whether the government and people of Aceh will be able to protect these forests in the face of logging, mining, road and plantation concessions sponsored by others with short-term interests, in order to ensure the equitable, sustainable and profitable use of this unique resource for local benefit over the long term.

Destructive fishing practices. Efforts to restore pre-tsunami fisheries production in the waters around Aceh are flawed. Indeed, over-fishing and destructive fishing methods were widespread before the tsunami. Most large breeding fish had already been caught, and productive benthic ecosystems had been damaged. Rather than restoring pre-tsunami conditions, therefore, 'building back better' in the fisheries sector requires a different approach. Marine protected areas (MPAs) should be established at the kabupaten level, so that breeding fish can safely achieve a large size and maximum reproductive output. The creation of MPAs should also be combined with educational and other interventions aimed at increasing compliance with regulations prohibiting destructive fishing activities.

Damage to coastal ecosystems. It is necessary to restore the coastal ecosystems – especially mangroves – that were extensively damaged before the tsunami and were further impacted by the event. The continued use of an aquaculture model based on bare mud and fishponds that are managed with intensive labour, energy and chemical inputs, and that are highly vulnerable

to sea-borne calamity, is a particular matter of concern. A mangrove aquaculture model could be introduced instead, through local dialogue and direct exchange between communities in Aceh and communities elsewhere in Indonesia where successful mature mangrove aquaculture systems have been established. These systems have proven to require fewer inputs and be more environmentally secure and productive. Lessons learnt from an analysis of the fates of 30 million mangrove seedlings planted in Aceh since the tsunami shed further light on the merits of this approach and how it may be implemented.

The brown assessment: environmental aspects of reconstruction

The brown assessment found that although many current environmental problems already existed before 2004, the reconstruction process itself is clearly having significant impacts on the environment. The team identified several major issues of concern.

Contaminated groundwater. In many tsunami-affected areas, shallow groundwater – a major source of drinking water – is still brackish and contaminated with faecal bacteria. Alternative drinking water sources are urgently required. Newly built houses must be provided with adequate sanitation systems to minimize future groundwater contamination. Water from deep aquifer systems is mostly of good quality and should be considered a major long-term drinking water source. There are, however, some indications of saltwater intrusion and possible contamination with faecal bacteria, perhaps as a consequence of inadequate drilling techniques. It is of utmost importance to monitor water quantity and quality in these aquifers, and to limit water extraction to sustainable levels. In some cases, the water from deeper aquifers contains high concentrations of heavy metals, particularly arsenic, that require further monitoring and partial treatment.

Soil degradation. Due to the tsunami, a thick sediment layer covers approximately 1,000 ha of agricultural land. Some areas remain saline, requiring improved land drainage. As the restoration of these areas can be very

expensive, alternative land use practices should be considered (e.g. animal husbandry).

Sand and gravel extraction. Widely uncontrolled extraction of sand and gravel from rivers is expected to change river flow patterns and to increase the rivers' scouring force, threatening damage to major infrastructure along the rivers. Riverbed quarrying should be reduced to a minimum. Alternative sand and gravel deposits away from riverbeds should be explored and developed.

Undisposed waste. Large quantities of tsunami and household waste still need to be cleaned up. Waste is clogging drainage systems and posing a major public health risk. Waste collection and disposal facilities are deficient, and hazardous waste is scarcely taken into account. The collection and treatment of waste, particularly hazardous waste, should be improved and safe waste disposal facilities created.

Improper siting of houses. The locations chosen for the reconstruction of houses are not always appropriate. Houses are sometimes built in highly disaster-prone or environmentally sensitive areas, or in areas where the water table is very close to the surface. Such mistakes could be minimized by using a simple checklist enumerating important siting criteria, and by taking into account spatial planning instruments (e.g. maps of high-risk areas).

Inadequate sanitation. Inadequate or inexistent sanitation facilities in reconstructed houses are a major source of surface and groundwater pollution, particularly in areas with very shallow water tables. Houses should always be built with adequate sanitation systems that minimize water pollution; simple soak-aways should not be allowed. The minimum requirement for individual houses should be properly constructed, for example dual chamber septic tanks from which overflows discharge onto leach fields situated a safe distance from wells. Where possible, small water treatment plants should be constructed for groups of houses and larger settlements. The sustainable long-term management of these systems is required, as is a major awareness campaign: most people currently seem unaware of the risks posed by inadequate sanitation and unfamiliar with the operation and maintenance of sanitation systems.

Unsustainable building materials. The excessive use of burnt clay bricks in the reconstruction of houses – together with the fact that brick kilns use mainly energy-inefficient production techniques – creates a very significant demand for fuelwood. This fuelwood often comes from illegal logging operations. At least a portion of the bricks should be replaced with alternative construction materials (e.g. hollow concrete blocks), and efforts should be made to improve the energy efficiency of the kilns.

Environmental institutional capacities

Weak environmental impact assessment process: The current process for assessing the anticipated environmental impacts of reconstruction projects is deficient at both the strategic and the operational levels. This is probably largely due to the limited resources and capacity of the Provincial Environment Agency (Bapedalda NAD) to carry out the required environmental impact assessments (EIAs). Bapedalda's capacities must be improved significantly and swiftly. Additional short-term external help may be needed to meet shifting demand. At present, several types of projects with potentially negative environmental impacts are not subject to the EIA process. The screening criteria for deciding which reconstruction projects

require EIAs should be revised, and adequate tools, including processing checklists, should be elaborated at once. Even when EIAs are not required legally, the environmental aspects of projects like the reconstruction of houses could be taken into account using environmental impact checklists. Aid agencies also need to improve their own EIA capacities, while the province should develop a more strategic approach to environmental decision-making and undertake strategic environmental assessments of reconstruction and development plans.

Environmental monitoring: Environmental monitoring is an essential tool for environmental management. The province's monitoring capacities must be improved. Additional laboratory equipment, a GIS-based environmental information system and capacity development are needed.

Information and coordination: Due to the magnitude and complexity of the reconstruction process, information management, coordination and communication among stakeholders are priority issues. Specific strategies for different aspects of environmental management (e.g. waste management or monitoring) would improve coordination and facilitate the monitoring and evaluation of the reconstruction process.

Introduction

The setting

The Indonesian province of Nanggröe Aceh Darussalam (Aceh) occupies the northern tip of the island of Sumatra and lies between 2-4o N and 95-98o E. The province has an area of 57,365.57 km², and a population of approximately 4,010,860. Aceh is divided into four municipalities (or Kota) – Banda Aceh, Langsa, Lhokseumawe, and Sabang – and 17 districts (or Kabupaten), each of which is further divided into sub-districts (or Kecamatan) (Table 1).



Table 1: Districts and Sub-Districts of Nanggröe Aceh Darussalam

District (Kabupaten)	Sub-District (Kecamatan)
Aceh Barat	Johan Pahlawan, Arongan Lambalek, Woyla Barat, Kawai XVI, Meureubo, Pantai Ceureumen
Aceh Barat Daya	Manggeng, Tangan-tangan, Susoh, Kuala Batee, Babah Rot
Aceh Besar	Lhoong, Lhok Nga/Leupeung, Leupeung, Seulimeum, Mesjid Raya, Darussalam, Baitussalam, Simpang Tiga, Darul Imarah, Peukan Bada, Pulo Aceh
Aceh Jaya	Teunom, Panga, Krueng Sabee, Setia Bakti, Sampoinet, Jaya
Aceh Selatan	Trumon, Trumon Timur, Bakongan, Bakongan Timur, Kluet Selatan, Kluet Timur, Kluet Utara, Pasie Raja, Kluent Tengah, Tapak Tuan, Sama Dua, Sawang, Meukek, Labuhan Haji Barat
Aceh Singkil	Singkil, Singkil Utara, Kota Baharu
Aceh Tengah	
Aceh Tenggara	
Aceh Timur	Birem Bayeun, Rantau Selamat, Sungai Raya, Peureulak, Peureulak Timur, Peureulak Barat, Rantau Peureulak, Idi Rayeuk, Banda Alam, Idi Tunong, Darul Aman, Nurussalam, Julok, Pante Beudari, Simpang Ulim, Madat
Aceh Tamiang	Seruway, Bendahara, Manyek Payed
Aceh Utara	Syamtalira Bayu, Tanah Jambo Aye, Seuneubon, Baktiya, Baktia Barat, Lhok Sukon, Samudera, Syamtalira Alon, Tanah Pasir, Dewantara, Muara Batu
Bener Meriah	
Bireun	Samalanga, Pandrah, Jeuniaeb, Peudada, Juli, Jeumpa, Jangka, Peusangan, Gandapura
Gaya Lues	

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