EURONATURE EDITION

Paths to Sustainable Development

New Experiences in the Philippines

Edited by
Claus-Peter Hutter
Friedhelm Göltenboth
Michael Hanssler

Hirzel

Dedicated to Prof. Dr. Paciencia Milan, President of Leyte State University, the staff of the Leyte State University and the people of Leyte for their grand engagement for "Sustainable Development and the preeservation of biodiversity".

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CONTENTS

"RAINFORESTATION FARMING": MODEL PROJECT FOR SUSTAINABLE RURAL DEVELOPMENT AND BIODIVERSITY REHABILITATION IN SOUTH EAST ASIA

Prof. Dr. Friedhelm Göltenboth • Claus-Peter Hutter • Prof. Dr. Pacencia Milan

Problem

The Philippine archipelago consists of about 7,107 islands, 860 of which are permanently inhabited. About 67 million people live mainly on the larger islands like Luzon, Mindanao, Samar, Leyte, Negros and Cebu. About 28% of the population live below the officially declared poverty line of US$ 1 per day. The average life expectancy is 66 years and the population growth rate is about 2.3% per year. About 45% of the population live in rural areas and 40% of the workforce is employed in the field of agriculture.

Primarily during the last 40 years, the forested area was reduced from 17 million ha to 5.5 million ha as a result of disastrous logging and land use practices. Thus, only less than 6% of the originally 60% of the total forested land area has remained as prime habitats for wildlife and genetic conservation.

The hardwood tropical trees were exported mainly as logs. In this way, a country originally rich in tropical hardwood trees was turned into a country poor in timber. For this reason, the government has been forced to impose a total logging ban since 1990.

Due to the steadily growing population pressure and the political instability, particularly during the dictatorship of the former president Marcos and his family, vast areas of the mid-mountain regions were transformed into settlements by slash-and-burn practices. This led to biological and agronomical "deserts" particularly in the erosion prone slopes of the mid-mountains.

Furthermore, old stands of coconuts in plantations, covering about 2 million ha, contribute to the increasing rate of economical and ecological impoverishment in rural areas. The decreased yield of these 50–60 year old stands

of coconuts and the drastically falling prices for copra led to an increase in poverty.

Replanting urgently needs to be carried out, This is difficult, however, in view of the high level of investment required and the low expectations of revenue.

Older coconut stands are therefore being cut down and used as timber which leads to even more serious ecological consequences than already faced by the logging of the rainforest. All the manifold ecological functions of a forested area, such as even and regular water supply for the environment, improvement of the soil fertility, provision of a habitat for animals and plants, and prevention of outbreaks of plant and animal epidemics, are threatened by soil erosion, sedimentation of near-coast marine coral reefs and floods, particularly during rainy season. Also the near-coast fish and other marine animal stock is endangered.

The migration of the rural poor to the slums of the cities is one consequence; another is the even heavier exploitation of the remaining ecosystem.

Challenge

The challenge is to help alleviate the poverty in rural areas of the Philippines by developing and implementing technologies for sustainable development and improvement of the socio-economic livelihood of the rural poor, prevention of further environmental degradation and rehabilitation of biodiversity.

Project Goals

The primary project goal was to establish the subject of tropical ecology in teaching, research and extension at the former Visayas State College of Agriculture, now Leyte State University, on Leyte.

This would guarantee that a contribution is made towards the sustainable improvement of the social and economical living conditions of the rural poor of the region by improving environmental conditions.

These efforts led to the development of three major results in this model project supported by EURONATURE, University of Hohenheim and Leyte State University:

- The so-called "Rainforestation Farming Technology" by which only indigenous local tree species are used, including shade-loving, slow-growing primary forest species of tropical hardwood trees, as well as sun-demanding, fast-growing pioneer trees and fruit trees.
- Provision of a sustainable income for the rural poor
- Protection and rehabilitation of the environment and biodiversity

Environmental view

The island character of the Philippines, particularly on Leyte, is stressed by the fact that the mountainous central cordillera drops sharply down from about 1,200 m above sea-level to the Camotes Sea, leaving sometimes not more than 200–1,000 m between the coastline and the foothills. The vulnerability of this area of frequent seismic events along the Philippine fault line to any disturbance is high. Also the livelihood of the rural population, who are often farmers during daytime and fisherman during night, is heavily dependent on the given environment. The very fertile alluvial coastal lowlands along the Camotes Sea are dependent in all their ecological and economical functions on the watershed areas of their hinterland. Therefore, any major disturbance in the upper and middle watershed area directly influences the livelihood of the rural population whether as farmers or as fishermen. This holds true for the past and the present and is visible in form of huge coconut and sugar cane plantations. The establishment of these monocultures without any consideration of environmental or ecological necessities or consequences was one of the major reasons a flood which occurred in 1991 in the area of Ormoc City killing more than 8,000 people in a single night.

The most obvious destructive and dangerous element to today's environment is the removal of primary and secondary forest particularly in the upper parts of the mountains.

Without a profound change in attitude towards the use of forests, disasters can occur again at any time and the transformation of the fertile parts of the environment into land of no agricultural value is unavoidable. Therefore, a reforestation program was urgently needed that would be implemented in a way that ensures the rural poor are beneficiaries and protects the rich local biodiversity threatened with extinction due to the loss of the indigenous forested areas.

Biodiversity aspects

The area of Leyte, particularly Mt. Pangasugan, is still one of the biodiversity highlights in the Visayas. Due to the fact that this area was either extremely difficult to reach for commercial logging or part of the College controlled area, the following species are still found here: the Philippine eagle-owl *(Bubo philippinensis)*, hornbills *(Buceros hydrocorax semigaleatus)*, flying lemurs *(Cynocephalus volans)*, Golden-capped Fruit Bat *(Acerodon jubatus)* and even the smallest and only true carnivorous monkey of the world, *Tarsius syrichta* (Tarsiers).

This 120 g nocturnal ape is only known from the Philippines, Kalimantan and Sumatra and is a highly endangered species on the international red list of endangered organisms. All the other mentioned animals are also endangered with the exception of the hornbills, described as vulnerable on the red list.

The list of fish, amphibia, reptiles and insects still unknown is certainly long. Whenever collecting expeditions were carried out, new species of animals and plants were found. For example, in 1993 two new species of fish belonging to the family of Gobiidae were described that had been found in the rivers running down from Mt. Pangasugan. In 1995 the holotypes of 11 new species of beetles were placed in the National History Museum. In 1996 three new orchid species were found on trees in the remaining primary forest parts of Mt. Pangasugan. It is well known but not recognized that a tree in a rainforest is not only a standing piece of timber but a home for many creatures.

Major results of these investigations about the biodiversity were published as field guides for the wider public and are available in bookstores (e. g. Guide to the ecosystems of Palawan Echinoderms of the Philippines, Native Philippine orchids).

Social economical aspects

Usually people have no concept of the exhaustion and replacement of natural resources. They do not realize that trees, unless replaced by man or nature, are non-renewable resources. The general notion is that man can always go into the forest and forever cut down trees without the need to replenish and maintain them. Therefore, high priority must be given to the development of innovative reforestation technology supplemented by educational measures at all levels. More than 30 community organizers implementing the developed technologies in the villages were engaged, thousands of people took advantage of the hands-on training developed for interested farmers, educators and administrators. In addition, 25 Master's and Bachelor's degree students were upgraded in related

fields and support was given to 10 PhD students presently all working as academic staff in cooperation with the newly founded Institute of Tropical Ecology of the Leyte State University.

Further, it became clear that the rural poor living near a forested area will only become involved in conservation efforts if they benefit from it economically or politically or by increased status.

In addition to the 17 ha model farm with its 4 ha of near-to-nature closed canopy demonstration forest in the boundaries of the Leyte State University, long-term trials were run by local subsistence farmers or farmer cooperatives on 27 other sites throughout the island of Leyte, as well as on Palawan, Bohol and in Mindanao. More than 1,500 ha were included in farming activities using the "rainforestation farming" technology.

The revenue from the tree-farming system will give the farmers 5–7 years from now a good, continuous and steady income from the sale of timber only. During the first years, the farmers' income will continue to be mainly from growing crops under and between the growing tree seedlings.

The farmers are gradually switching from sun demanding crops to shade demanding crops like ginger, cardamon, coffee and abaca. In addition, the sale of tree seedlings for other private and governmental reforestation projects or for the ornamental market is becoming a new source of income for the local farmer.

Rainforestation farm after 12–15 years; hardwood trees in combination with fruit trees, rattan, shade-tolerating crops and ornamentals.

Due to the fact that he is active in line with the official policy of planting more trees and protecting the indigenous environment, the government could be convinced in a growing number of cases that illegal squatters could be made permanent residents and tenants of the given farming area with permanent land ownership certificates.

Some cooperatives became such active protectors in their respective watershed area that they even brought illegal loggers to court and received policing rights for the respective watershed by the Government authorities.

Sustainability aspects

The "rainforestation farming" technology was chosen and developed under the assumption that a farming system in the humid tropics becomes increasingly sustainable the closer it is in its species composition and physical structure to the local rainforest ecosystem.

It could be proved during the 9-year pilot phase that by using local pioneer and hardwood tree species, including the highly valued Dipterocarpaceae, for a community-based farming system and complementing it with livelihood programs during the initial first years of the tree-farming practices, the income of the local farmers can be increased considerably and the long-term expectations of the activities are realistic and therefore sustainable.

In addition, local biodiversity is protected and even rehabilitated. Therefore, the ecological and economical benefits of this promising and sustainable land use management system is very high.

Transferability aspects

This innovative technology could trigger more widespread initiatives and help solve serious degradation problems in former rainforest areas. It could be transferred with respective adaptations to other local environments and situations in many areas throughout South East Asia.

One cooperative on Leyte has meanwhile set up its own training program in "rainforestation farming" technology and is offering this farmer-to-farmer training scheme to about 300 villagers per year.

Due to the very widespread interest in this specific approach for reforestation in rural areas of the humid tropics, numerous talks were given on all levels and publications were produced with a view to disseminating the results (e.g. "Rainforestation Farming" booklet in three languages used in the Philippines or the book "Rainforestation Farming").

It is safe to say that this approach of using only local indigenous tree species for reforestation schemes, including local fruit tree species, could easily be adopted throughout the humid tropics.

Chances and Perspectives

"Rainforestation Farming" technology provides for the reforestation of degraded areas and old coconut stands by establishing a highly diverse and economically future-oriented, sustainable tree farm. It produces an income opportunity out of an area that is no longer economically productive, while at the same time producing timber of high quality for a demanding market. Its goal is to protect and rehabilitate the land and conserve local biodiversity. Biodiversity conservation and protection is achieved in the following ways:

- First, actively through propagation and planting of endangered tree species in a near-to-nature planting scheme
- Second, passively through the creation of a suitable habitat and microclimate to which species migrate from adjacent forest or secondary growth areas
- Third, through involvement of the local communities in the active protection of the remaining forests; the mother trees in these forests are the resource for the seeds needed in the nurseries

Both the he preservation of nature with its fundamental ecosystem functions and the stabilization of a good subsistence farm income can be achieved if the present system of land-use management is gradually replaced by a system that is ecologically sound.

Of crucial importance is the adjustment of the technology to the local situation. The farmers must have the opportunity to select elements of the "rainforestation farming" system and combine them with the agricultural system familiar to them. One of these systems is the production of natural fibres from the pseudo-stems of textile bananas or Abaca *(Musa textilis)* grown in the shade of trees. The production of high-quality fibres for possible use in relevant industries could lead to the alleviation of rural poverty. This would help reduce the economic pressure on subsistence farmers by giving them another opportunity to make a decent living in the rural areas and not opting for a life in the urban centres for the poor, also referred to as slums.

Fertile volcanic soils on the foothills of Mt. Pangasugan (1,100 m). The middle and upper parts are covered with tropical evergreen rainforest surrounded by coconut plantations.

By introducing this method to other areas of the humid tropics, many areas of devastated former forestland could be rehabilitated as ecologically and economically valuable countryside. This technology is therefore a substantial contribution to stop the ongoing destruction of the remaining primary forests by desperate rural farmers.

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