

Chapter V

Conclusions and recommendations

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How have China and in particular Guangdong Province fared in their forest rehabilitation¹ activities and what lessons do they offer for guiding future efforts? Both Guangdong Province and China as a whole have witnessed substantial increases in forest cover² since the 1980s (five and 38 million ha respectively), mostly through rehabilitation of degraded forest land³. But a sizeable proportion of the forests regenerated have poor growth and stocking, and many sites are highly susceptible to pest, disease, frost and fire damage. This is due to limited species-site matching, particularly of exotic species, and the establishment of vast monoculture landscapes of conifers, poplars or *Eucalyptus* with uniform stand structures. Some project sites (particularly the earlier ones) were not maintained or were degraded in the long run and then became the target of repeated rehabilitation attempts. Available mature forest resources for timber production continued to decrease despite an increase in forest cover, since new forests were young and overlogging continued in the mature natural forests till the 1990s.

1 See Chapter I for details on rehabilitation terminology.

2 Forest refers to area with greater than 20 percent (> 30 percent prior to 1996) tree canopy cover, bamboo groves, some shrub lands specially prescribed by the State, farmland shelterbelts, and trees planted around villages, rivers, roads and houses. It includes timber, shelterbelt, fuelwood, *economic* (non-timber products) and special purpose forests.

3 There is no official term “degraded forest land” in China. We estimated degraded forest land in the larger study as the sum of burnt-over forest areas; logged-over areas; *sparse forest*; and some grass, shrub and barren land identified as suitable for planting trees.

The National Afforestation, plain greening and some shelterbelt forest projects report reduced soil erosion and improved protection of farmland as a result of the rehabilitation efforts. Some projects report increased grain yields and positive effects on water availability and flooding. However, others claim that environmental conditions continue to deteriorate and that gains in some areas were offset by losses elsewhere. Plantations with single species, simple structures, and little ground vegetation and litter were not effective in watershed protection and soil conservation in many areas. Also there is concern that site productivity may decline with continuous cultivation of single species such as Chinese fir (*Cunninghamia lanceolata*) and *Eucalyptus urophylla*. There has been very limited scientific monitoring and evaluation of environmental outcomes of rehabilitation initiatives in Guangdong and China as a whole though such objectives continue to drive large public rehabilitation efforts.

In Guangdong, city landscape projects had better long-term growth and forest quality because they planted a mixture of species to improve forest diversity, structure and function and meet local needs. Using a bidding system and contracting the *afforestation*⁴ tasks to qualified agencies ensured quality standards in City landscape and Coastal sites.

Project reports indicate that there were substantial production and livelihood benefits arising from some national programs such as the Three-North shelterbelt, coastal shelterbelt, plain greening and Taihang Mountain greening programs. However, some reports or reviews (for Yangtze River shelterbelt, Three-North shelterbelt, plain greening, desertification control, natural forest protection and sloping land conversion programs) note negative socio-economic impacts as well. People lost their rights to harvest the resources and thus their income source in some areas. Farmers were unsure about the survival and marketability of the species planted through some large programs. In Guangdong, incomes have increased in general with economic development. People also earn income from the regenerated forest products (mainly fruits and other non-timber products), and through rents from land lease and profit-sharing arrangements with private enterprises.

⁴ *Afforestation* includes forest establishment through planting trees, aerial seeding or *mountain closure* on barren mountains, barren sandy land, *sparse forests*, burnt-over and logged-over forest areas, and some shrublands and grasslands. It also includes planting trees along roads and rivers, around houses and villages and as shelterbelts in farms. The term "*afforestation*" as used in China includes greening recently deforested areas.

The farmers and communities require policy support and technical assistance to sustainably produce and market timber. The private sector⁵ including household forest farms in the Three-North region benefited from timber production where restraints such as high taxes and fees and harvesting quotas were absent or removed. China's forest industry and its forest product exports have grown rapidly over the last decade. In *ecological forest*⁶ sites, economic compensation payments⁷ as provided by the governments in Guangdong Province and elsewhere were far below the opportunity costs for use of the land.

In many large government projects, there were problems with long-term maintenance of the rehabilitated areas given no further funds and lack of local participation and stake in the project. Disturbances were reduced on sites where adequate benefits flowed to local people, dependence on forests for subsistence was reduced, and tenure rights were secure.

1. Recommendations for Guangdong

Based on the lessons learned from the Guangdong study, we make the following recommendations to ensure long-term sustainability, positive outcomes and sustained interest in forest rehabilitation. These recommendations cover technical, socio-economic, legal, political, administrative, financial and long-term management aspects. Where recommendations are specifically for public or private sector or for *ecological* or commercial forests, this is indicated.

1.1 Technical aspects

Useful measures that have contributed to successful rehabilitation should be continued. These include demonstration sites, inspection and evaluation systems, and fire prevention and protection measures. Both public and private sector projects, whether for *ecological* or commercial purposes, need to improve or expand in the following areas to ensure the quality and long-term sustainability of rehabilitated forests:

5 Private sector here refers to farmers afforesting and managing their allocated lands, and individual investors and private enterprises afforesting and managing leased or subcontracted forest land for their own income. There is no strict recognised definition and many mixed public-private sector institutional arrangements exist in practice.

6 *Ecological forests* or non-commercial forests are for the purpose of maintaining and improving the ecological balance and the environment, conserving biodiversity, and providing non-timber forest products.

7 The term "Economic Compensation measures or payments" for ecological forests used in China is equivalent to the term "Payment for Environmental (or Ecosystem) Services" used elsewhere.

1. Conduct scientific planning and design

Forestry administrative authorities above the county level should conduct macro-planning in accordance with classified forest management and local site conditions. The project implementers should submit overall design specifications matching the larger plan and an operative flow chart, plus annual specifications and flow charts. These specifications should be the basis for inspection.

2. Ensure species site matching

Choose appropriate species for the site conditions to ensure good growth and yield, and better resistance to frost, pests and other elements.

3. Establish more mixed forests

Establish more mixed forests with multiple layers and species, and include superior native broadleaved tree species to increase the forest's capacity to resist fire, pests and disease. City landscape sites are a good example. This recommendation definitely applies to *ecological forests*, but even commercial forests could aim to establish a few different species with different characteristics to enhance environmental and commercial benefits and minimise risks of pests, fires and site degradation. Natural regeneration could continue to play a large role, particularly in *ecological* projects. In commercial forests, natural regeneration dispersed between single-species stands could act as buffers against pests and fires and help maintain soil fertility.

4. Use superior seeds and robust seedlings

As learnt from the National Afforestation Project conducted in Guangdong, superior planting material should be used with an agency inspecting and certifying the seeds and seedlings for their quality.

5. Use existing scientific knowledge and provide technical assistance

Each step of the rehabilitation process from planning to seedling cultivation, site preparation, forest establishment, tending, and pest and disease control should be based on sound scientific techniques and methods to ensure long-term sustainability and quality. Public sector projects should allocate funds for obtaining such technical guidance from research institutes and experts, and for training project managers and workers. The government should continue to provide technical training and support for the private sector.

6. Assess environmental outcomes

Government sector projects should have plans embedded in the process to scientifically measure and monitor the outcomes of desired environmental objectives from the pre- to post-project period. Some city projects are now conducting such monitoring. More general studies should be undertaken by national or international research institutes to assess environmental conditions and outcomes following rehabilitation by private sector projects.

7. Promote the bidding system

This is primarily for public sector projects and for *ecological* purposes. The

bidding system used successfully to implement and ensure the quality of city and coastal rehabilitation projects in Guangdong could be adopted more widely. Qualified agencies could be chosen through the bidding system. However, with the precaution that since long-term care is left to landholders, they should be adequately involved from the start with benefits accruing to them to ensure their stake in management. Alternatively there could also be bidding contracts for long-term management but this will require ensuring funding for both compensation payments to landholders and management payments to bidding companies on a permanent basis. The feasibility of meeting such costs long-term should be assessed.

1.2 Socio-economic aspects

In Guangdong, collectives or communities are the designated managers of 92.4 percent of the forest land⁸. Hence the socio-economic aspects are critical and it is essential that communities actively participate and have a stake in the rehabilitation process if it is to be sustainable in the long run. Policies should continuously support and refine the factors contributing to successful rehabilitation, such as stable and clear land tenure rights, mechanisms to resolve disputes and flexibility of tenure transfer. All projects should adopt effective institutional arrangements such as joint management⁹ and targeted benefits for communities where possible. To ensure long-term sustainability and positive livelihood outcomes, further improvement in the following areas is recommended:

1. Patrol and protection

Private sector and *ecological forest* sites should have good patrol and protection measures in place and enter into agreements with local people for site protection.

2. Local participation

Obtain local community support and involvement in rehabilitating degraded forest land and protecting the resources in public or private sector projects by

- a. Providing commensurate community benefits such as *economic plantations*¹⁰ in the government and civil sector projects, and joint ventures and profit-sharing in the private sector projects. Economic compensation payments alone for *ecological forests* may be insufficient and the payments too low.

⁸ Forest land is the sum of forest, sparse forest, shrub land, young plantations, seedling nurseries, logged-over and burnt-over forest areas, and all land suitable for planting trees as designated by the different levels of government.

⁹ Joint management refers to cooperative efforts between institutions — such as forestry departments with other government departments, state forest farms with village committees, village committees with individuals and foreign enterprises — with sharing of land, techniques, management and benefits.

¹⁰ Economic plantations or forests are for non-wood products such as fruits, edible oils, beverages, fodder, medicines, spices and industrial materials like rubber for cash income.

It could be combined with fruits and other economic products for the communities where possible.

- b. Actively involving the communities as key participants through the process from decision-making to implementation to obtaining and monitoring benefits to ensure they have a stake in the outcome.
- c. Developing good relations, negotiating and setting out clearly the agreed sharing of costs, benefits, rights and responsibilities in contracts for each initiative.

3. Fuelwood consumption

Efficient fuelwood use as well as alternative energy sources such as gas, wind and solar should be explored and promoted to save forest resources, as in the Greening Guangdong project.

4. Livelihood outcomes

Conduct community surveys to clearly establish whether the targeted beneficiaries received the expected benefits, whether the benefits were adequate, and what the socio-economic impacts were. This could also be a useful monitoring and evaluation tool that could help derive satisfactory livelihood outcomes and support for the project.

5. Production and marketing support

Government agencies (and the private sector maybe through partnerships) should provide timber production and marketing support and more favourable policy incentives for communities rehabilitating degraded forest lands for commercial purposes. Also, adding value and improving markets and marketing of fruits and other non-timber rehabilitation products is recommended.

1.3 Political, legal and administrative aspects

Approaches that have contributed to successful rehabilitation should be widely adopted, such as well-designed and well-planned projects, targeted management and responsibility, penalty and reward systems, effective leadership and management, and communication and awareness building campaigns. Further support or expansion in the following areas is recommended:

1. Policies and political support

Extend strong and responsive political support at provincial and national level to quality, protection and management, and timber production issues in public sector projects; and further incentives for the private sector in commercial and *ecological forests*.

2. Regulations and enforcement

Ensure good post-project follow up by government including enforcement of logging quotas and guidelines.

1.4 Long-term management and financing

Favourable investment policies such as logging permits and quotas, credit assistance and open wood markets issued by Guangdong Province should be maintained and refined to encourage private sector interest and involvement in rehabilitation. To ensure long-term viability and sustainability, the following aspects need to be improved:

1. Long-term management

Ensure focus on long-term management beyond initial plantation establishment in public sector projects to sustain the efforts.

2. Long-term financing

Projects should build in funding mechanisms (including reinvestment from product sales) for long-term management, technical assistance, harvesting and subsequent regeneration. Guangdong's "Forest Protection and Management Regulation" stipulates that "all levels of government should allot funds equal to and not less than 1 percent of their budgets for *afforestation*, forest management and protection, *ecological forest* development, and for forestry science, technology and education". This requirement should be implemented.

3. Timber taxes and fees

Assess and revise timber taxes and fees to ensure financial viability and stimulate investment interest in forestry.

4. Timber production plans

Public sector projects, especially those executed by communities and households, need timber marketing plans and implementation in the long-term.

5. Economic compensation

Assess the viability of the economic compensation incentive and rates to support *ecological forest* rehabilitation and protection. Low rates and lack of guaranteed long-term payments could act as a disincentive to sustainable rehabilitation. Can direct beneficiaries in the public or private sector be identified and part funding be obtained from them? Do the management guidelines and compensation payments actually help achieve the objective of enhancing environmental services?

Guangdong's provincial government has already been working towards addressing some of the problem areas, making the following stipulations in recent years:

- a. The 1998 stipulation to build high-quality *ecological forests* by adjusting the forest composition and structure.
- b. The 2001 stipulation emphasising scientific planning and organising, species-site matching, targeted management responsibility system for rehabilitating

- degraded forest land and protecting forests from pests, diseases and fire, and adopting the bidding system in rehabilitation projects.
- c. The 2001 decision to strengthen *afforestation* achievements, and enhance forestry's three benefits (economic, social, and environmental benefits), provided some preferential policies on timber taxes and fees and logging quotas for the private sector.
 - d. The 2002 issue of the "Guide to prescribed qualifications for entities and corporations that bid for planning and design, development, supervision and inspection of *afforestation* projects".

More focus and effort is required in the following areas: ensuring active community participation and giving local people a stake in rehabilitation projects; support for communities for timber production and marketing in commercial forests; increased focus on long-term management and financing methods; enforcement of logging guidelines; and measuring and monitoring environmental and social outcomes.

2. General recommendations for China overall

Many of Guangdong's lessons and recommendations to ensure the success and long-term sustainability of its rehabilitation efforts can be adopted for other Chinese provinces as well, with or without modifications. However, some recommendations may only be relevant for areas with similar favourable site and socio-economic conditions. China is a large and diverse country. The poorer remote mountainous areas and arid regions in the west are inhabited by sparse populations of minority ethnic groups. Forests are important in western China for local needs and income, while at the same time there are expectations that these areas should be rehabilitated and conserved for watershed and other environmental services for China as a whole. Much of the western mountain area is currently under a logging ban related to the natural forest protection program and is also the target of the sloping land conversion program (from agriculture to forests).

The eastern region, particularly the coastal region of which Guangdong is a part, is industrially developed and prosperous, has good markets and infrastructure and holds much of the commercial plantation area of China. Within the eastern region, there are remote mountainous sections as well that are less developed and poorer with limited market access. Much of the southern forest region and the northern plains is managed by households, while the natural forest areas of the northeast and southwest are state-managed. Timber supplies from state-managed natural forest regions are declining, while collective and household-managed areas contributed 43% of the national timber production in 2002.

In the past, the central and provincial governments successfully compelled local governments and leaders to meet planned rehabilitation targets through a system of targeted management and responsibility, rewards and penalties. This government-driven system is losing its effectiveness in the new market economy situation but huge national programs continue to call for mobilising substantial financial and human resources to meet targets. The forestry administration is stretched and funding is limited. Also farmers are not required to provide free and obligatory labour for public tasks such as forest rehabilitation any more. In richer developed provinces such as Guangdong, it is easier to develop viable commercial forestry with appropriate incentives and to make some modest payments for environmental services. Poorer remote areas with limited funds and low market access need a different strategy. This diversity in conditions calls for more locally-driven initiatives, leadership and planning to be effective.

Forest rehabilitation and management could possibly contribute to China's western region development plan and help alleviate poverty in that region if local people obtained long-term secure rights over the land and resources as in Guangdong and elsewhere in the south. Also any development initiatives should be participatory and arise from local needs and conditions. With favourable policy incentives and technical, marketing and credit support, local people could rehabilitate forests, derive income from forest products and potentially contribute to environmental services over the long term.

We list below some general recommendations for China as a whole drawing on both the national-level review and the Guangdong study. Where relevant, we point out recommendations that may be more suited for the developed eastern areas and alternatives for poorer remote areas.

1. Promote local initiation, planning and implementation of rehabilitation efforts to ensure their long-term local viability, rather than huge top-down programs. Plans should reflect ground realities and be easily adaptable as required. Lessons from Guangdong and first reviews of the sloping land conversion program indicate that local initiatives tend to be more successful in the long term.
2. Plan the rehabilitation process and choose species and techniques to be used in each case based on the specific objectives to be met (such as reduce soil erosion or produce quality timber), the site and climatic conditions, local needs and marketability in that region. Thus the methods selected would vary for the arid areas, for the mountainous regions, for the eastern plains and coastal areas, and also at a more local scale. They would also differ for watershed protection forests versus timber production or fuelwood forests.

Multiple objectives and needs have to be balanced and may require a considered trade-off.

3. Consider having more mixed forests (species and structure) wherever possible in both private and public sector projects to reduce vulnerability to pests, diseases and fire; reduce market risks and/or meet diverse local livelihood and environmental needs.
4. Scientifically assess the environmental and socio-economic outcomes of the projects to determine whether they are meeting the stated objectives. Focus on quality targets besides the area to be afforested. Use the results of these evaluations to redirect or fine-tune the rehabilitation process.
5. Explore and adopt innovative institutional arrangements as in Guangdong to bring together capital, resources, expertise and diverse interests for mutual benefit. Particularly promising arrangements are joint management or *stock-sharing*¹¹ arrangements where state agencies and/or private enterprises link up with farm households, leading to local stake in protection and management and benefits for all.
6. In richer cities and provinces that can afford to pay and local subsistence needs are low, adopt the bidding system widely used in Guangdong to employ qualified agencies to implement public sector projects for environmental purposes and ensure their quality. Elsewhere, be sensitive to local peoples' needs and consider alternative strategies, such as sustainable forest management for products and environmental services by communities or the private sector with adequate tenure security.
7. Involve local people as key participants in the rehabilitation process from inception to protection to benefit sharing to ensure they have a stake in the outcomes and long-term sustainability of the efforts. Negotiate and set out clearly the agreed sharing of costs, benefits, rights and responsibilities in contracts for each initiative.
8. Ensure adequate short and long-term benefits accrue to local people in the area. Promising approaches from Guangdong include *economic plantations* (fruits and other non-wood products) and profit-sharing in private sector projects. Open quotas, low taxes and good markets for timber can also help

11 Farm households contribute land, and companies contribute funds and establish, manage and harvest the timber plantations in a stock-sharing system. Benefit-sharing arrangements would generally be in the ratio 70:30, company to farm households. Fruits and other non-timber products are often included as additional incentives for farmers.

small-scale farmers directly benefit from timber production as in the Three-North farm forest region.

9. For long-term sustainability and flow of desired benefits, provide and stabilise local tenure rights over the land and the resources as in Guangdong; promote long-term management, income generation and reinvestment plans; and design and enforce appropriate regulations to safeguard the environment while meeting production needs.
10. Explore and promote efficient fuelwood production and management, and alternative energy sources (such as gas, solar and wind energy) as in the Greening Guangdong project.
11. Strengthen local institutions and train professionals to provide technical assistance and production and marketing support to the private sector and farmers involved in forest rehabilitation efforts. Make available superior and diverse planting stock.
12. Leave commercial forestry to the private and civil sectors and market-based mechanisms. Remove existing constraints where they exist, such as high taxes and fees, logging permits and quotas to make commercial forestry viable. Allow investors to manage their resources freely in response to forest conditions and market signals. However, impose some legal safeguards to ensure sustainable management. Consider alternative funding sources for administrative expenses in villages and counties where fees from forestry operations are the main public revenue source.
13. Assess the viability of the economic compensation incentive and the rates to support *ecological forest* rehabilitation and protection, particularly in poorer areas where people depend on forest resources. Explore whether the management guidelines and compensation payments actually help enhance ecological integrity or environmental services. In poorer areas, consider whether sustainable forest management for products and services by tenure-holding farmers could help achieve the same environmental goals while meeting local livelihood needs.