Negotiation-support toolkit for learning landscapes

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24 | Quick biodiversity survey (QBSur)

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The Quick Biodiversity Survey (QBSur) diagnoses the 'biodiversity health' of a landscape, including its agricultural components that are usually not considered as niches providing ecosystem services. QBSur provides information on the diversity of plants, birds and bats; the biodiversity gradient of areas with high and low biodiversity levels; and perceptions of local stakeholders on (agro-) biodiversity and their interests in conservation.

Introduction

Biological diversity (biodiversity) is the number, variety and variability of living organisms, which can be described in term of genes, species and ecosystems. Biodiversity plays an important role in sustaining the world's ecosystems. The conversion of forests to intensive agriculture and monoculture plantations leads to a loss of biodiversity in any landscape. Generally, the rich biodiversity in natural or managed systems does not provide tangible benefits: a reason why local people may not be interested in conservation initiatives.

Payment for agrobiodiversity conservation involves extensive consultations with both beneficiaries and providers of conservation services. These environmental services' providers usually live in agricultural landscapes with high local and global biodiversity values or which harbour species of special interest, such as tigers, orangutans, rhinos or endangered birds. Data on such high-value species and biodiversity richness are usually available. Occasionally, however, where detailed and current biodiversity data are unavailable or need to be validated, a rapid survey may provide sufficient information necessary for instigating a full RABA. The QBSur was developed for this purpose. Besides information on vegetative species, QBSur also studies animal diversity, such as birds and bats, which play important roles in the ecosystem as pollinators, seed dispersal agents and biological controllers. Furthermore, humans as an integral component in an ecosystem play the most important role, exercising direct influence over land-cover changes. Thus, local people's understanding of local activities and their effects on biodiversity are also captured in the QBSur.

Objectives

A QBSur assesses the biodiversity of plants, birds and bats within a landscape, identifying areas of higher and lower biodiversity and the links between them, as well as providing a detailed picture of the health of the biodiversity. Perceptions of the local people with regard to local practices and the use of resources as well as perceptions of biodiversity are analyzed.

Steps

QBSur uses indicator plant and animal groups. The animal groups, which include dung beetles, bats, small mammals, primates and birds, can be modified depending on their importance in the locality but the survey technique should be maintained for consistency and data comparison.

The QBSur can be conducted in two weeks in consultation with experts. A local guide who is knowledgeable about local plants and animals is necessary for the field work.

Indicator animals and plants are surveyed along kilometre-long transects; the layout and frequency of sample points are determined by the animal groups being surveyed (Figure 24.1). Time and other resources permitting, the number of transects can be increased to improve the accuracy of survey data.

In general, the survey, identification, data analysis and reporting can be completed in about six weeks.

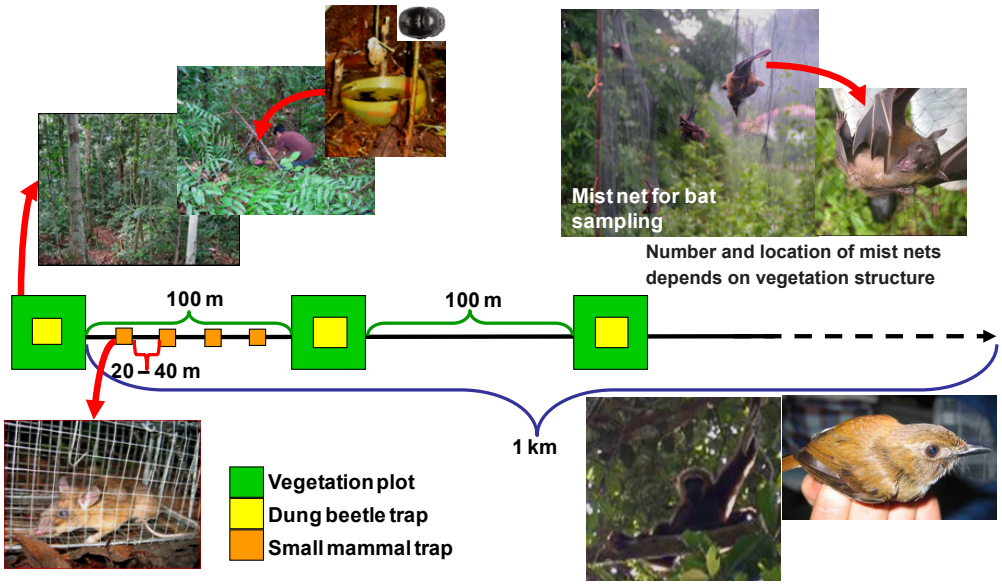

Figure 24.1. Sampling locations of vegetation plots and dung beetle and small mammal traps along a transect

Case study: QBSur of a rubber estate

Rubber plantations in Dolok Merangir, Indonesia, have a long history. The first was established in 1916 for the Goodyear tyre company. In 2005, the Dolok Merangir and neighbouring Aek Tarum plantations were sold to Bridgestone, a tyre company based in Japan. We conducted a QBSur focussing on the diversity and species' composition of vegetation in the plantations compared with the surrounding smallholdings and forests. The QBSur resulted in recommendations on how to improve biodiversity on the Bridgestone estate.

Summary of findings

- All farmers perceived that rubber agroforests were the most important land use as they could provide sources of income, food and environmental services. The second-most important land use was smallholding oil palm, followed by smallholding rubber monoculture. These provided the main cash income for households.

- People's understanding of biodiversity was closely associated with livelihoods' patterns and social practices, as biodiversity contributed to their daily needs and was related to specific knowledge. However, the boom in palm-oil production and its high prices had influenced farmers' decisions in conserving high-biodiversity ecosystems.
- Forest loss was followed by an increase in tree-based systems, such as rubber monoculture and oil palm. Smallholding rubber areas decreased while oil-palm plantations rose dramatically during the period 1970 to 2010. Early conversion of the forest at Dolok Merangir implied relatively stable, non-forest, land-use systems for a longer period of time and, by the time of the QBSur, the rubber plantations had developed into a mature system. The old rubber systems provided a more stable habitat for the different biodiversity components in the plantation area and this might benefit biodiversity conservation.
- Vegetation analysis was conducted in the three habitats of rubber plantation, rubber smallholding and forest. Rubber plantations had the lowest vegetation diversity owing to the intensive management practices to increase latex productivity. On the other hand, farmers traditionally grew various useful species in their agroforests through protecting seedlings, maintaining plant diversity at all stages. The species' composition of the tree stage was completely different. The sapling and pole stages on the plantations and rubber smallholdings were dominated by rubber trees as this was the productive stage for latex and hence the farmers maintained the rubber and minimized competition from other trees.
- Carbon and nitrogen are two important elements in soil organic matter. Soil analysis at the rubber plantations and smallholding rubber sites indicated that the carbon–nitrogen ratio was relatively constant across all soil depths but was slightly lower than in forest soil. This implied that the nitrogen content on the rubber plantations and smallholding sites was higher than in the forest soil. Fertilizer application may have affected the nitrogen content at these sites. In addition, soil fertility on the smallholding and rubber plantation sites was lower compared to forest soil.
- Bird diversity was analyzed in four habitats (forest, rubber smallholding, rubber plantation and emplacement) and 728 individual birds were recorded, consisting of 142 species from 42 families. The types of bird, categorized by feeding habit (guild type), decreased with vegetation type. Forests were the most diverse for bird species, with 17 guilds. This implied that the rubber plantations did not provide a suitable environment for some birds with specific roles. The differences in the tree composition of the three habitats of the plantations and their surroundings influenced bird species' richness, diversity and composition.
- Additionally, a large number of raptor bird species were found in the rubber plantations, such as the Brahminy Kite *(Haliastur indus)*, the White-bellied Sea Eagle *(Haliaeetus leucogaster)*, the Black Eagle *(Ictinaetus malayensis),* the Crested Hawk-eagle *(Spizaetus cirrhatus),* Blyth's Hawk-eagle *(Spizaetus alboniger)* and the Crested Serpent Eagle *(Spilornis cheela).* All these raptors are protected under Indonesian laws and regulations. Moreover, the high number of raptors implied that this area was important as part of their home range. The availability of food in the rubber plantations and their surroundings was important in supporting the population.
- Based on the bird protection status published by the International Union for Conservation of Nature and Natural Resources, within the four habitats we recorded 12 species that were categorized as 'near threatened' and two species categorized as 'vulnerable'. In addition, one bird species listed in CITES Appendix I—*Rhinoplax vigil* (Helmeted Hornbill)—was encountered in the forest habitat.

- Bat diversity in the three habitats was studied to identify the level of species' richness and their roles and functions in the habitat. We live-trapped 234 individual bats from three families, consisting of 11 species, with eight of the species in the suborder Megachiroptera (fruit eaters) while the rest were Microchiroptera (insect eaters). Insect-eating bats play an important role as predators of mosquitoes and other plant pests, while the Megachiroptera are pollinators and seed dispersal agents. According to the IUCN status lists, all the bat species encountered in the study area were categorized as 'least concern'. The low value of bat diversity along each transect illustrated that the rubber plantations were in an alarming condition owing to the imbalance in the number of individuals of each species within the community.

Recommendations from the QBSur

Buffer zones, such as rubber agroforestry smallholdings, play a role as corridors for animals to reach forests. Vegetation in rubber agroforests supports bird and bat diversity. To improve biodiversity in the area, we recommended preserving the intermediary vegetation, such as in riparian areas, along the main roads, sealed roads in the plantation and on steep slopes.

As an intermediary region could be a corridor between one region and another on the border of a plantation, we recommended to not only plant rubber trees but also a mix of other trees to provide food and places for nesting and resting for birds and bats (subject to the fruit not being preferred by humans, so it is left for the animals).

Trees with a narrow canopy would minimize light competition with the rubber trees that make up the main commercial crop in the plantations. Several suitable species for planting are *Ficus* species, *Canarium indicum* (canarium nut) and *Syzigium polyanthum* ('salam'). Bamboo could be planted along the river banks to support birds and bats by providing places for nesting. In addition, other tree species, such as *Inga (Euphorbiaceae), Sonneratia (Lythraceae)* and *Palmae* can also support bats.

Key references

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The landscape scale is a meeting point for bottom–up local initiatives to secure and improve livelihoods from agriculture, agroforestry and forest management, and top–down concerns and incentives related to planetary boundaries to human resource use.

Sustainable development goals require a substantial change of direction from the past when economic growth was usually accompanied by environmental degradation, with the increase of atmospheric greenhouse gasses as a symptom, but also as an issue that needs to be managed as such.

In landscapes around the world, active learning takes place with experiments that involve changes in technology, farming systems, value chains, livelihoods' strategies and institutions. An overarching hypothesis that is being tested is:

> Investment in institutionalising rewards for the environmental services that are provided by multifunctional landscapes with trees is a cost-effective and fair way to reduce vulnerability of rural livelihoods to climate change and to avoid larger costs of specific 'adaptation' while enhancing carbon stocks in the landscape.

Such changes can't come overnight. A complex process of negotiations among stakeholders is usually needed. The divergence of knowledge and claims to knowledge is a major hurdle in the negotiation process.

The collection of tools—methods, approaches and computer models—presented here was shaped by over a decade of involvement in supporting such negotiations in landscapes where a lot is at stake. The tools are meant to support further learning and effectively sharing experience towards smarter landscape management.

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ASB Partnership for the Tropical Forest Margins
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IFAD Enabling poor rural people to overcome poverty
CGIAR Research Program on Forests, Trees, and Agroforestry