Summary Report and Presentation Abstracts

Satoyama Initiative Regional Workshop in Sabah 2017

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Complex Rice Systems; Putting Ecosystem Restoration into Practice

Keywords: Complex rice systems, ecosystem restoration, smallholders

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Global rice production and the importance of ecosystem function restoration for smallholders.
Rice is the staple food of nearly half the world's population, of which more than 90% is concentrated in Asia. Rice is cultivated in a wide range of ecosystems, from upland to lowland, from rainfed to irrigated and from deep water to tidal marsh. The majority of rice farmers are smallholders and vulnerable to environmental and market changes. Besides the fact that green revolution packages have levelled off in terms of the rice yield, they also have created a dependency on external inputs and caused widespread environmental pollution through water flows in rice systems. This has caused significant biodiversity loss and led to ecosystem dysfunction. Ecological restoration of damaged rice ecosystems can potentially improve water and air quality and slow biodiversity loss by re-introducing plant and animal species. This creates benefits for smallholder farmers and human livelihoods. Although the potential contribution of biodiversity to the functioning of agro-ecosystems have been studied intensively, practical implementation in agriculture remains scarce[1]. Our project on complex rice systems (CRS) provides a practical model of ecological restoration.

CRS project on rice production systems in East Java.
In a collaboration between IORC and FSE, the project is conducted in East Java, Indonesia following a three-step method consisting of an on-farm experiment, a workshop and a participatory learning processes of the farmer field school (FFS). The project emphasizes the restoration of functional rather than compositional diversity to restore ecosystem functions of (i) weed and pest suppression and (ii) nutrient cycling. Re-introduction of fish and ducks in rice systems can suppress weed and pest infestation by exploiting the feeding and movement behaviour of these species. Growing border plants to attract natural enemies strengthens this function. Edible border plants also provide additional ecosystem services: provision of nutritious food, improvement of farmer income, and nutrient cycling by integrating sunhemp as N-fixing plants in the rice systems. Together with azolla, sunhemp, is cycled by fish and ducks through their feeding system: the excreta provides nutrients for rice. The restoration project was replicated in other areas with slight adjustments to the elements and design. The three-step method can be used to duplicate the model to other areas.

A sample of CRS in East Java, a. in Lamongan District; b, in Malang District

Challenges to mainstreaming CRS to restore ecosystem functions and services

Three main challenges may limit the widespread implementation of CRS to restore ecosystem functions: high initial capital outlay, illiteracy of smallholders and their lack of access to information, and the lack of immediate benefits. First, the initial capital outlay includes: (i) purchase of materials for fencing and duck housing, (ii) purchase of initial inputs (organic fertilizers, duckling, fish, azolla and border plant seeds) and (iii) labour costs to build and managing the duck house and fish shelter/ pond and to widen the ridges to grow border plants. We recommend adopting a step-by-step approach to implement CRS across two to three rice-growing cycles, starting with the construction of the fishpond and straw collection for duck house, compos and fish feed from previous rice harvest. Cooperation with duck farmers may also be helpful. Second, illiteracy and lack of access to information are obstacles for smallholders. Successful mainstreaming of CRS therefore requires the provision of appropriate training. We organized FFS that combined training and experimentation to improve farmer knowledge on agro-ecology. We recommend using pictures and videos to address the illiteracy of FFS participants. Keys for success are skilled communication, involvement of multiple stakeholders and respect for local cultural practices. Lastly, ecosystem restoration processes provide few immediate benefits. To motivate farmers to implement CRS, we include elements that increase farmer income as an immediate benefit, such as vegetables that are easily grown and sold in rice ecosystems as border plants.

References

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