LEGATO

Land-use intensity and Ecological Engineering – 
Assessment Tools for risks and Opportunities 
in irrigated rice based production systems

Antragszeitraum / application period:

Module A: "Interactions between land management, climate change and ecosystem services"
Ecological Engineering

- design, monitoring and construction of ecosystems;
- development of strategies to maximise ecosystem services through
- exploiting natural regulation mechanisms (instead of suppressing them).
Ecosystem Services – the baseline of the LEGATO approach

- Ecosystem services dealt with in LEGATO:
  - Provisioning: biomass & nutrients (rice & other crops),
  - Regulating: biocontrol & pollinators,
  - Cultural: cultural identity, recreation & tourism
Figure 7.1: LEGATO overview structure and work flow
7 Regions (15x15 km²) with contrasting land use intensity and natural resources; 5 landscapes per region; in total more than 70 sites
LEGATO Ifugao (PH_3) research sites

- Batad
- Banaue

Map showing research sites with labeled coordinates and distances.
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Case study:
regulating services

pest control – pollinators

implementation
Figure 6: Simplified food web of “traditional” rice field (from Koch et al. 1990, modified); arrows indicate the trophic relationships (according to energy flow in the food chain)
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Leaf folder control in early crop stages increases vulnerability to hopperburn by 10 folds.
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Insecticide sprays have no effect on hopper – Only few specialist species for egg mortality
Increasing flora diversity in rice fields

Photo by: Ho Van Chien
Flowers are food sources for beneficia
s
• Provide food and shelter to natural enemies
• Facilitate regulatory ecosystem services – predation and parasitization
How to communicate egg parasitism

Three common planthopper parasitoids:
A = Oligosita  B = Anagrus  C = Gonatocerus
Why bees?

• Bees are bigger, easier to observe and also well known.

• Farmers are taught to observe the bee populations as indicators of parasitism.
Landscape transformation in many Vietnam districts
Entertainment-Education: New approach in communicating sustainable land management and biodiversity conservation

M. Escalada, K.L. Heong & H.V. Chien
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<td>Supporting and provisioning services of rice ecosystems</td>
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<td>Role of ecological services</td>
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<td>Nutrient and fertilizer requirements of rice</td>
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LEGATO TV episodes (II)

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Green Ecological Engineering

Dragonflies
Vietnam Turns Back
A ‘Tsunami of Pesticides’

Convincing Vietnamese rice farmers to use less pesticide came down to letting them see the benefits for themselves.

For years, the entomologists at Vietnam’s Southern Regional Plant Protection Center in Long Dinh had tried to sell rice farmers on the benefits of reducing pesticide use—to little effect. So in 2001, they took a different tack: They challenged 950 farmers to try for themselves.

In one plot, the farmers grew rice using their usual amounts of seed and fertilizer, spraying insecticide whenever they thought it was needed—which was often. In a nearby plot, they didn’t spray at all for 40 days after planting and used less seed and fertilizer as well. To the farmers’ surprise, the yield from the experimental fields was as good or better, while costs were lower, generating 8% to 10% more net income. From then on, they were convinced, recalls Chien Van Ho, who collaborated on the project.

out Asia—“but not in the Mekong Delta,” says K. L. Heong, an IRRI insect ecologist. Thanks to the more judicious use of chemicals, natural predators helped keep plant-hoppers in Vietnam in check.

Clean as a swimming pool
The Green Revolution of the 1960s and ’70s introduced sturdier plants that could support the heavier grain loads resulting from intensive fertilizer use. Rice production in Asia more than doubled. But it left farmers believing more is better—whether it’s seed, fertilizer, or pesticides.

Rice farmers became accustomed to spraying soon after planting, when they first saw signs of the leaf folder, which appears swimming pool,” Heong says. What’s more, tests have shown that killing plant-hoppers now takes pesticide doses 500 times greater than in the past. More and more plant-hoppers survive to suck sap from the young rice plants, causing them to wither.

As early as the 1980s, IRRI and the FAO convinced some Southeast Asian governments that with so-called integrated pest management (IPM), natural predators could control plant-hoppers. In 1986, Indonesia banned 57 pesticides and completely stopped subsidizing their use. But progress was reversed in the 2000s, when growing production capacity, particularly in China, unleashed a “tsunami of pesticides,” says FAO entomologist Peter Kenmore. Even some in the agrochemical industry concur. “We all agree that in Vietnam, farmers have overapplied pesticides in some production environments,” says Kee Fui Kon, who oversees rice-related R&D at the Swiss agrochemical giant Syngenta.

Radio soap opera
In Vietnam, the Mekong Delta trial helped change conventional wisdom among farmers and agricultural officials. The study led
Let 100 flowers bloom. Vietnamese rice farmers are encouraged to use less pesticide and to grow flowers and vegetables on the banks of their paddies.