Summary Report

Blitar Region, East Java: A Case for Sustainable Breadfruit Production Using Traditional Agroforestry Methods

Prepared by Trang Cao
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Existing Infrastructure and Agricultural Resources

Blitar is an example of successful rural-industrial clusters: interrelated and interdependent group of local enterprises that provide inputs, raw materials, services, primary agricultural production or farming systems, processing, handling, packaging, distribution.

Highly fertile soils occur mainly in Java where complex agroforestry systems occur exclusively in the form of small home gardens and shared village forest lands. The breadfruit grown in this region is found exclusively in these two agroforestry models with the addition of wild forests.

The Javanese home gardens of Indonesia, is perhaps the most widely studied model of home agroforestry systems, an oft-cited example of accrued wisdom and insights of farmers who

have interacted closely with the environment, without access to external inputs, capital, or scientific skills.

Models of Agroforests in Java

We find 3 models of agroforestry in East Java:

• Homegardens (*pekarangan*): a land use form on private lands surrounding individual houses with a definite fence, in which several tree species are cultivated together with annual and perennial crops, often including small livestock.

• Mixed gardens (*kebun campuran*): a land use form on private lands outside the village, which is dominated by planted perennial crops, mostly trees, under which annual crops are cultivated.

• Forest gardens (*talun, kebun*): a land use form on private lands outside the village in which planted and sometimes spontaneously grown trees and sometimes additional perennial crops occur.

> 27% of Java forests maintained by civilians
> home gardens cover 20% of arable land in Java
> estimated 5.13 million ha of land under *pekarangans* (homegarden) in Indonesia
> 1.74 million ha are in Java

Breadfruit Trees Part of Intercropping & Multistory

Along with:

- Several types of rhizome: pink and blue ginger, awaphui ginger, galangal, Javanese turmeric
- Average 26 medicinal plants and spices
- Understory: shade tolerant root crops like elephant foot yams, giant taro, cana root
- Between trees: more sun-loving root crops like cassava and sweet potatoes
- Upper Story: durians, jackfruit, mangoes, breadfruit
- Middle story: star gooseberry, banana, papaya, guava and cacao
- Annual vegetables chilis, eggplant, cucumbers
- Pigeon pea and other nitrogen fixers

These gardens are examples of intimate, multistory combinations of various trees, shrubs, herbaceous and vegetable crops, sometimes in association with domestic animals, around homesteads.

Important to note: that in some situations, multistory tree gardens are not in physical proximity to homes but receive the same level of constant attention from the owners' household and

have similar structural and functional attributes as other home garden units located near homes.

Importance of Home Gardens

Typically home gardens range from 250–500 m2 (so 0.25–0.5 hectare), some up to 1400m2 Non-commercial homegardens kept the multistrata structure better than the commercial gardens and little to no external input.

Food plants (food crops, fruit trees and medicinal plants) are the most common species in most homegardens—underscores the fact that food- and nutritional security is the primary role of home gardens

Homegardens also play an important role in the conservation of indigenous crops, thus enhancing biodiversity in rural and peri-urban environments.

> Homegardens in West Java, Indonesia, contained the greatest diversity with an average number of 56 species per garden, while East Java has biodiversity of about 50 species.

> On a limited scale, primarily only for household consumption, farmers cultivate cassava, banana, yam, and pineapple in the forest area bordering homesteads and farmland with only a small management input, little disturbance to the forest and no appreciable deforestation. After harvesting the crops are replanted. This is an example of forest farming.

Home Garden Soil Composition Compared to Plantation Farming

> There was a significant correlation between the use of external inputs and the type of homegarden: most commercial gardens used those inputs, while very few non-commercial gardens did. The ones from which breadfruit was sourced do not use any external inputs or inorganic fertilizer

> These homegardens and communal tree gardens provide an example in sharp contrast to intensive plantation agriculture based on trees, or with plantation forestry, which both depend heavily on specialized techniques, genetically altered plant material and capital and energy intensive processes of crop establishment and maintenance.

> Agroforest development, on the other hand, is affordable to local populations as it relies on simple techniques that all shifting cultivators in humid tropical countries have at their disposal. It is based on local knowledge shared by all farmers and does not imply high energy or capital inputs

> Net income generated from home gardens ranged 7–56% of total household income.

> In West Java, the productivity of home gardens was more than twice the productivity of rice fields.

> In West Sumatra, agroforestry products accounted for 26–80% of the total income from agricultural produce (rice fields and gardens).

Roshetko et al estimated the aboveground carbon stock of Indonesian home gardens at 30–123 tonnes of carbon per hectare with an average of 35.3 tonnes per hectare at 13 years, which corresponds to carbon stock found in similarly aged secondary forests.

Importance of Homegardens and Wild Forests:

Traditional homegardens have received special attention in Indonesia since the 1970s, when the Institute of Ecology of Padjadjaran University discussed the role of these homegardens in rural development.

> Social Forest Program initiated in 2003 let farmers and stakeholders around forest actively participated in the revitalization of forest areas, in which logging was illegal.

> The program allowed farmers and poor landless people to grow food crops in between the rejuvenated forest tree. In turn the farmers had responsibility to manage and care for the forest trees

> Farmers working in the Forest Build Association, called LMDH (Lembaga Masyarakat Desa Hutan) or “Rural Community Around Forest” have the right to share the profit from timber as well as yield of associated understory crops.

Advances in Agroforestry:

Agroforestry, or multistrata growing systems, already practiced by communities in Java but they need to be shared and scaled up

In upland Java, fruit-based agroforestry has spread rapidly in the past two decades, thanks to some tenure innovations. One can now acquire rights in trees by either leasing or sharecropping of trees.

Sharecropping occurs when a landowner who does not have the wherewithal to institute tree cultivation joins efforts with a fruit producer, who plants the trees and provides the owner with a share of the product of the trees.

Alternatively, trees may be leased, an arrangement in which capital-rich growers lease trees from land-owning poor peasant

Methods Used in Our Research:

- Cut survey in line with open ended group discussion
- Focus groups
- Field observation methods were used to identify the range of local agroforestry systems in the research site, and their structure, species, management and products.
- Household survey of 20 agroforestry farmers and randomly selected 20 households with homegardens in which breadfruit was grown

Green Program:

- Primarily educational outreach: Knowledge sharing through village chiefs and elder aims to support the value of organic products with no external inputs

- Support existing agroforestry practices of homegardens and communal gardens

- Collecting breadfruit peels for animal feed and for a mixed compost pile near site of factory that includes waste materials from other food processing plants and cow manure.

Collaborating Partners:

1. Syed Ajijur Rahman, research on Agoforestry models in Java
2. Institute of Ecology, Padjadjaran University, Bandung
3. International Center for Research in Agroforestry (ICRAF)
4. World Agroforestry Centre (ICRAF), Bagor Indonesia
5. Dr. Augustin Mercado, ICRAF director Southeast Asia Regional Program
6. Ingrid Öborn (regional coordinator)
7. Secretary General of Horticulture: Novida
8. Director General Mr. Spudnik Sujono Kamino
9. Yudi Widodo, researcher who has advanced intercropping using agroforestry models
10. Dr. Sylvia Tiwon, socio-cultural formations in Indonesia and Nongovernmental organizations