



*Proceedings of the Sixth International Permaculture Conference  
September-October 1996, Perth, Western Australia*

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## **Why Integrated Permaculture for the Wet Tropics?**



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*[Submitted Paper]*

### **Introduction**

The wet tropics have everything needed for permanent agriculture (Permaculture), without any imported input such as fossil fuels, chemical fertilizers, toxic pesticides, or growth stimulants, and an optimum abundance of livestock, fish and plants all the year round. The wet tropics should supply the rest of the world with all kinds of foods, economically and ecologically, and leave the polluting but essential high-tech industries and goods, such as aeroplanes and chemicals, to the temperate nations.

Unfortunately, such has never been the case, and the wet tropics were forced during the past century or two to grow cheap commodities and even raw materials for export to those temperate nations for processing and added value, which were then re-exported to the countries of origin as manufactured goods at many times the original prices. The big bio-diversity of the lush tropics was gradually destroyed to give way to huge ranches of cattle or sheep, and vast plantations of monocultural oil-producing crops or commodities.

What made things worse was the replacement of proven and time-tested biological and cyclical systems, using the favourable tropical and environmental conditions, by unsound methods relying on imported agrochemicals and fossil fuels to produce cash crops, creating varied environmental problems, at the neglect of fresh foods and essential crops for local needs. Then chemically produced and processed foods of lower nutritional value were imported to feed the population, creating new metabolic and other serious diseases.

The Integrated Permaculture is designed to solve all these new problems and re-establish the traditional ecological and socio-economic systems, but enhanced with appropriate biotechnological processes to meet the increasing demands of a modern society.

### **Mauritius as a case study**

Mauritius is a small tropical island in the Indian Ocean of over 1 million people with various racial and ethnic communities co-existing harmoniously despite their different cultures. Since it became independent in 1968, it has made continuous progress in social and economic fields. Its economy was based on monoculture of sugarcane and processing into raw sugar for export, but lately the diversification of crops, tourism, clothing and various import replacement industries have become just as important, with full employment and reasonable social services available to all.

However, most of the staple foods are imported, and the future of sugar is not very bright in the post-GATT era, with over 100 countries producing sugar in a free market within 10 years, when free trade is scheduled to start, with tough competition from countries with lower wages. The ideal solution would be to cut out sugar altogether, and have 2 crops of sugarcane yearly for optimum fibre production. The syrup will contain enough sugar for new industries such as plastics, detergents, and water softeners. Other useful products, besides fibre for paper and board industry, are lignin as a clean-burning fuel, furfural and other useful chemicals. The material separation is done by steam explosion, which requires low energy input and is non-polluting.

For the diversification programme, 6 sugar estates have joined forces to build an Integrated Farming System (IFS) at Union Sugar Estate to demonstrate the viability of having livestock, fish and plants in a recycling system that produces its own fuel, fertilizer, feed and raw materials for a wide range of fresh and processed foods and goods to meet local needs, and is nearing completion. This is particularly interesting since most sugar estates have very ambitious diversification plans, which already include a big variety of livestock and various fruit, vegetable and flower crops. The culture of fish and prawns has started, but as monoculture which requires external sources of feed and energy, reducing the profits considerably. Especially with prawns, the high costs of feed and energy have now become so prohibitive as to make their culture non-viable. Savings in energy and feed from the IFS can make a very big difference.

A more ambitious integrated Permaculture project is the Integrated Biomass Recycling (IBR) complex, which is being implemented at the Government Agricultural

Research and Experiment Unit in Curepipe. It is to demonstrate the treatment and reutilization of ALL urban, rural and agroindustrial wastes effectively and efficiently, using simple structures for bio-conversion into useful products for maximum profits at very little costs. It consists of three interdependent modules:

1. *Integrated Sewage Plant* for the wastewaters from a nearby housing estate of 220 families. It uses simple tanks with a combination of contact oxidation panels, soil absorption beds, oxidation basins, fish ponds and macrophyte channels. The nutrient-rich effluent is used to irrigate and fertilize aquaponic, aeroponic, hydroponic and multi-level crops on the premises or on adjacent integrated farms.
2. *Integrated Compost Station* for the municipal garbage, septic tank sludge, night-soil and garden refuse from a nearby garbage transfer station. It uses special windrows to convert the mixed garbage into rich and safe compost within 3 weeks, and is used as a soil conditioner on agricultural land. The residual solids are recycled or buried without the methane and leachate problems plaguing all landfills around the world. The ICS is best located near an integrated farm for synergistic reasons.
3. *Integrated Farming System* to deal with livestock wastes, crop and processing residues, household and other rural wastes, as explained above. It is most effective when ample water is available. Where the surplus water from the aquifer flows into the streams and rivers, and is wasted into the coastal waters, sound water management should be practised, with construction of many small dams and diverting the water into as many large and deep ponds as possible for polyculture of many kinds of fish, fertilized with digested and oxidised manure. These ponds also act as reservoirs, and raise the level in the aquifer to prevent intrusion from nearby stream water which can easily be contaminated.

## Conclusion

The Integrated Permaculture concept can be located in any convenient low-lying land in the countryside around any built-up area. In a bigger town, the sewer pipes are laid for gravity flow to the nearest integrated sewage plant, which is run by an integrated farming family that can also look after the integrated compost station with the help of hired labour. The income from Integrated Permaculture can be so substantial that there will be no more incentive for the young to leave the land and end up in urban slums.