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Ecology and Farming

The magazine of the International Federation of Organic Agriculture Movements

Organic Farming for Biodiversity
by Ranil Senanayake

Organic Agriculture and Hunger Crisis
by Louise W. M. Luttikholt

Indigenous Perspective on Organic Futures
by Brendan Hoare

IFOAM
INTERNATIONAL FEDERATION OF ORGANIC AGRICULTURE MOVEMENTS

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IFOAM Head Office:
Charles-de-Gaulle-Str. 5
53115 Bonn
Germany.
Tel: +49 - 228 - 926 - 5010
Fax: +49 - 228 - 926 - 5099
Email: headoffice@ifoam.org
www.ifoam.org

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Editor: Anita Deppe
Sub-editors: Gabriele Bertolli, Cory Whitney
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Different Perspectives on the Organic World

After a few months' hiatus, the electronic magazine Ecology & Farming is back in action with a considerable selection of articles from all over the organic world! The shift from a print version to an electronic, downloadable online version has been successful and we thank our readers for understanding that we had to take this decision for two reasons: to contribute to the reduction of CO2 emission and to be more cost effective.

Ecology & Farming has always aimed to serve as a forum for exchange of information and experience on organic/sustainable agriculture and agroecology within and across sectors and between the continents. This issue particularly reflects such a philosophy, offering a broad outlook on organic facts all, highlighting several different perspectives and points of view on the organic world's latest developments and areas of concern.

We are sincerely grateful to all the authors that sent us their articles: we believe that all the contributions on this issue are extremely valuable and interesting for our attentive community of readers. For example, in this issue you will find Ranil Senanayake's thoughts about how organic agriculture can contribute to the conservation of biodiversity. Furthermore, Brendan Hoare offers us the Maori angle on organic farming and standards, while Louise W. M. Luttikholt reflects about the so-called food crisis and the answer that the worldwide adoption of organic agriculture could give to it.

We strive to bring you timely information that we believe you will find relevant for your role in the organic movement. Do you have any comments to share with us about the articles in this edition or are you an author willing to publish an article on the next issue of Ecology and Farming? Send us your thoughts, your "Letter to the Editor". We will publish selected commentaries as well as relevant articles in the next edition. Contributions in the form of advertisements or advertorials are also most welcome, our ever increasing readership appreciates all forms of information. Please enquire about our very competive rates.

Due to the overwhelming response to our call for articles, we had to shift some to the next issue. So be on the look out for Ecology & Farming in December/January when you will find many interesting articles once again, with the main focus on Food Miles. Deadline for contributions will be November 1, 2008.

IFOAM Head Office and the newly elected World Board encourages you to continue your support. You may also consider joining IFOAM as a member, an associate or a supporter. This will give you even greater access to information, e.g. the members only electronic newsletters Insider and IFOAM in Action, or our web-based Training Platform. Remember: Knowledge is Power !

Angela Caudle de Freitas
IFOAM Executive Director
Email: a.caudle@ifoam.org

Developing the Potential of Organic Farming for the Conservation and Sustainable Use of Biodiversity

By F. Ranil Senanayake
Rainforest Rescue International
Email: ranil@earthrestoration.org

Biodiversity is the measure of the variability of living organisms at any spatio-temporal point. It does not mean wild, endemic, rare or even native, merely the measure of variability. This measure has various meanings, from indicating potential for economic development to indicating changes in the environment. It also signifies the way natural cycles work, in terms of their affectivity at cycling carbon, oxygen or water. The conservation of biodiversity refers to the conservation of this variability. Biodiversity is also a very effective summary of the prevailing ecological condition.

Studies on agricultural diversity suggest that high measures of diversity are often correlated with environmental stability. A rapid loss in the degree of biodiversity for instance suggests a loss in ecological stability. Therefore, the measure of biodiversity is a useful indicator of the health of an ecosystem.

Agriculture has always impacted the status of native biodiversity. Sometimes, as in the case of long rotation slash and burn the impact may have had a positive effect, but more often than not it reduces the opportunities for native species and has a negative effect on native biodiversity. Early agricultural fields were analogous to the native ecosystems being comprised of local species, but with increasing sophistication and mobility both the frequency and intensity of impact increased in agriculture. The introduction of exotic species became an accepted practice.

Modern agriculture driven by commercial goals has increased the impact of agriculture on natural ecosystems and its component biodiversity. If the frequency of biodiversity in terms of alpha or nominal biodiversity is examined it is seen that there is a decreasing frequency of native biodiversity and an increase in the frequency of exotic biodiversity as a consequence of increasing perturbation and stress in that agroecosystem. (fig 1.)

These are referred to in the modern literature as Traditional Home Gardens, Forest Gardens, Village Tree Gardens etc. (Wiersaum 1989, Rappaport 1971, Nair, 1989). Studies on the biodiversity status of landscapes

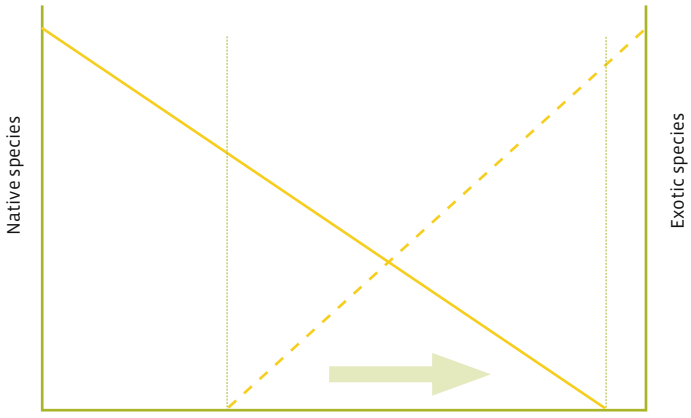

Fig. 1: Decreasing frequency of native biodiversity and increasing frequency of exotic biodiversity as a consequence of increasing degree of disturbance and stress in agroecosystems.

suggest that they can be divided into two distinct components, natural and anthropogenic (Senanayake and Palihawadene 1999), the natural containing only native biodiversity and the human influenced or anthropogenic containing hybrid biodiversity. Natural ecosystems retain the original patterns of biodiversity wherein native species occur in established seral patterns. Humans have not impacted these formations and processes with enough frequency or intensity to change established seral patterns. Natural biodiversity exists as the product of a long history of interactions between organisms, landscape and climate. It provides a measure of the naturally sustainable state for that ecosystem. Hybrid biodiversity contains a mix of natural and exotic species, it also has the sequence of seral

succession truncated or modified. The word 'semi natural' coincides with the term anthropogenic ecosystems.

In natural systems the biodiversity measure is comprised wholly of native species. In anthropogenic ecosystems that measure is set by definition and can often entail the inclusion of exotic or alien species (Senanayake 1991). Anthropogenic also includes the industrial monocultures of high energy input agriculture, agricultural development dictated by the current economic models of agriculture. As the demand for the production of economic goods increases so does the nature of the anthropogenic ecosystems. Thus a forest gives way to a forest village, a traditional rice paddy field, a rubber estate or a pinus plantation. Anthropogenic systems can then range from modified forests to urban situations where biodiversity gains are usually accomplished through the addition of exotic species. However, if the management system does not consider the value of maintaining high levels of biodiversity, these gains are quickly lost and site stable monocultures begin to dominate the landscape. Some authors suggest that traditional systems of land use, high in biodiversity, may provide the paradigm for future agriculture (Altieri 1983).

There is an increasing criticism of the use of monocultures in agriculture and forestry. The use of extensive monocultures as agricultural or forestry responses create large areas of low biodiversity and reduce ecological stability. However, it must be noted that the impact of monocultures varies with scale so that a small patch of corn will have a relatively low impact when compared to a large farm of corn.

When traditional agricultural systems are measured in terms of all organisms, these ecosystems often demonstrate some of the highest biodiversity values. The organisms that contribute to this gain are often exotic in origin. In some anthropogenic ecosystems many indigenous species have been lost, but other exotic species have taken their place. In the lowland forest gardens of Sri Lanka, over 70% of the 43 species of trees found were exotic (Senanayake 1987). In other anthropogenic ecosystems indigenous species have co-adapted to provide a sustainable agro-ecosystem (Senanayake 1983). This dynamic, constantly shifting mosaic, of natural and anthropogenic operated for over 3000 years on this island, to provide us with the living record of an amazing pattern of natural biodiversity that has been sustained till today (Senanayake 1994). However, the ability of the modern landscapes to continue this function comes increasingly into question.

The pattern of increasing ecological stability with increasing diversity in land use is also corroborated by studies of traditional land managers, whose management systems are sustainable and conserve a much higher level of biodiversity than conventional responses. High levels of diversity in the agricultural field produce positive effects of biological control, spread the risk in marketing and production, and distribute labor needs to fit a single family unit. These traditional land management methods have much to contribute to biodiversity management.

The Forest Garden Product (FGP) certification system recognizes these differences. Inspectors are expected to understand the concepts of biodiversity and be able distinguish between Anthropogenic Ecosystems and Natural Ecosystems. The first refers to ecosystems whose maturity processes and biodiversity components have been changed as a consequence of human intervention. The second refers to where these processes and components remain intact. The evaluation of 'success' in terms of management goals is based on indicators drawn from an understanding of particular bioregions and component biodiversity.

If we take the example of soil it is well recognized that the condition of the soil ecosystem has a critical bearing on the productivity and stability of the land. The diversity of species and trophic levels make soil as complex an ecosystem as a forest. An effect at one trophic level will have consequences at other levels. Work on pathogenic organisms of forest trees demonstrates that application of a particular chemical can suppress beneficial bacteria that control plant pathogens, creating increases of plant infections in the treated area, while the application of another chemical can encourage the growth of beneficial bacteria which suppress pathogenic organisms and promote better plant growth in the treated area (Cerra et al., 1987). Further, it has been shown that the application of herbicides can have either an inhibitory or stimulatory effect on many soil organisms (Anderson, 1978) by changing the nature of the ecological relationships of these

organisms. The critical nature of these interrelationships has been shown by work done in Russia demonstrating that the feeding patterns, and growth, of soil inhabiting saprophagous invertebrates depends on the activity of soil microorganisms, which in turn are stimulated by the activity of the soil-inhabiting saprophagous invertebrates (Ghilarov, 1963).

Agriculture changes the nature of the soil ecosystem, generally bringing about a loss of diversity and creating a new network of energy flows. As one researcher notes: "The communities of (microorganisms in) agricultural soils might be regarded as natural communities impoverished in species. The gradually increasing mechanical effects upon agricultural soils can be tolerated by a small number of species of high ecological valency" (Balough, 1963).

This suggests a loss of species that have specialized ecological functions and a corresponding increase in absolute numbers of a few species which function as ecological generalists. Knowing the soil ecosystem and by selecting a group of easily observable indicators. A good measure of land use regime may be gained.

The above ground ecosystem is treated in the same manner. A synthesis of the bioregional data, in terms of native and exotic species will yield its complement of indicators. This manner of monitoring makes it both efficient and interesting for both inspector and farmer.

The development of indicators must not be derived solely from 'modern data'. All traditions have built into them indicators for sustainable living. In Australia, the hunter gatherer life of traditional people depends on what food is available in a given area. This is known by indicators that were used varied from the color of the grass, to the calling of a cricket, a species of plant or the nesting of a bird (Walsh 1990). As a result, the ancient ecosystem management information developed a calendar that was responsive to biotic events. In Sri Lanka, Traditional Farmers would not begin clearing their fields until the call of the Pitta Bird, which heralded the rains (Senanayake and Jack 1998). The criteria for certification will benefit from the consideration of such knowledge.

As the optimal biodiversity measure for natural systems may vary from the optimal measure for anthropogenic systems, two fundamental units of measure may be considered one for natural biodiversity and the other for hybrid or anthropogenic biodiversity.

The most urgent question to arise from considerations of agricultural biodiversity is: What do the management techniques that give us an increase in cropping as well as

in biodiversity development look like? In many instances traditional methods of management have been found to be effective. In others, especially where the environment or traditions have been disrupted, modern approaches have produced good results. However, many other questions arise from these observations. Are the techniques only culturally or ecosystem specific? Can they be replicated elsewhere? This information is critical to the development of systems of sustainable agriculture that also contribute to the development of biodiversity.

Organic Farming arose from a need to produce clean food and sustain a healthy environment. Organic farming seeks to re-establish the balance that was maintained between farmers and the land for centuries. In contrast to the observations of decreasing biodiversity in monoculture situations, the pattern of increasing ecological stability with increasing diversity in land use is corroborated by studies of traditional land managers, whose management systems are sustainable and conserve a much higher level of biodiversity than conventional responses (Altieri and Merrick 1987). High levels of diversity in the agricultural field produce positive effects of biological control; spread the risk in marketing and production, and distribute labor needs to fit a single family unit (Conway 1985).

The important question is how do we identify the goals of organic production? Is the mere non-use of prohibited items a success? Has the maintaining of biodiversity any value? Has the sequestration of carbon or other ecological services any value?

If Organic means the production of food, from sustainable agricultural systems, it follows that the inclusion of biodiversity in its evaluatory criteria and the recognition of the difference between natural and anthropogenic biodiversity is critical.

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Feeding the World - Organic Perspective on the Current Hunger Crisis

By Louise W. M. Luttikholt
Strategic Relations Manager, IFOAM
Email: l.luttikholt@ifoam.org

Has anything changed? Hunger still exists, and has increased over the last decades, despite the Millennium Development Goal nr. 1 'Eradicate extreme poverty and hunger,' and despite the increase in the global food supply. As the Nobel Prize winning economist Amartya Sen notes: 'Starvation is the characteristic of some people not *having* enough food to eat... not of there *being* not enough food to eat'.

The pre-existing causes of inequity: dumping, no access to land, erosion and desertification are still there. What is new is that agrofuels, speculation with commodities, and changing food patterns are accelerating these problems and making them more prevalent. The people we see demonstrating and rioting are those who just escaped poverty and now have to spend over 50% of their income on food, which they thought to have available for other activities and personal development. The real poor, being so for generations, do not even have the energy for rallies. It seems cynical to speak now in terms of 'crisis' with the new hungry revolting; when a steady 850 million hungry over the past several years did not seem to worry us that much.

There is no ONE food crisis; rather there are many regional crises in different situations in different parts of the world. For example:

- In Asia, Thailand, the food crisis is reported to be a rice crisis, where, with a little delay, the local market prices follow the world market prices. Farmers are profiting, citizens are experiencing difficult times.
- In Argentina there is the soy connection. In order to protect national natural resources, the president Christina Kirchner decided to put a tax on soy that is meant for export, e.g. meant for feeding pigs in Europe. The soy producers who represent less than 10% of the farmers, but about 80% of the farmland, struck and blocked the roads for weeks so that no food could be transported to supermarkets and consumers. In the end, the president gave in.
- Countries from the North are adding to the crises by changing their pattern of 'food aid', for instance when politics in Bolivia don't meet the aspirations of the donor, the USA. An over 20 year dependency on US wheat ends suddenly without having an immediate remedy (like using and improving traditional and indigenous methods and food habits). Bolivia has a lot of fertile land; however it remained unused due to the donation of wheat.

The instant reaction of governments, donor and philanthropists is to focus on the production side of this story and come up with programs and ideas to increase production, with all possible tools and aids. For instance, the Alliance for a Green Revolution in Africa[1], driven by the Melinda and Bill Gates Foundation, after a call from Koffi Annan in 2004, focuses mainly on fertilizer dissemination and new seeds to bring small holders to more productivity. Given the other crises of our time like climate change and biodiversity loss, intensification of production is thought to give more room for nature and biodiversity. However the bigger systemic picture is undervalued when making such a claim. We cannot divide the world into land for agriculture and land for nature.

The preoccupation with productivity per hectare ignores the increasing evidence that it is not only supply factors, such as productivity per hectare, but demand factors, such as market opportunities, that determine agricultural development outcomes. In this context, higher prices *for farmers*, reflecting the real costs of production, may even mean an incentive to produce.

The focus on increased production and intensification will amplify the current problems: Over-exploitation of land and the introduction of chemical fertilizers and pesticides have stimulated a production system that tries to be independent of natural regulating processes and local resources, and is heavily dependent on non-renewable resources. As natural cycles are broken, this leads to

1. www.agra-alliance.org

increases in the severity of pests and disease outbreaks and greater problems with nutrient management. To solve these problems more pesticides and chemical fertilizers have to be used and a vicious cycle is established.

Agrofuels further deteriorate the system as they reduce cropping land: to replace 10% of their fossil fuel consumption, US and Canada would have to devote 30% of their arable land to monoculture, producing agrofuels. Through the production of agrofuels, food prices increase with the consequence that there is less access to food. Moreover, the destruction of natural ecosystems for the cultivation of agrofuel crops releases greenhouses gases in the atmosphere.

The current global environmental crises show that there is only one earth and one earth system. Despite this obvious fact the solutions presented suggest wrongly that this one world contains many systems that are distinct; as if they do not interact and are not interconnected. It does not make sense to intensify agriculture in an attempt to leave more room for nature; the negative effects will impact nature nonetheless. It does not make sense to burn agrofuels to save the climate, since the large scale production destroys the Amazons, needed for balancing the climate. And all these things will impact all human beings, as we are part of the one system too.

Recent research efforts and studies have shown that Organic Agriculture offers solutions to many of the environmental and social challenges the world faces today.

Recently, April 2008, the International Assessment of Agricultural Knowledge, Science and Technology for Development[2] concluded its 5 year process, taking global scientific stock of the state of agriculture. The IAASTD is a unique collaboration initiated by the World Bank in partnership with a multi-stakeholder group of organizations, including the United Nations Food and Agriculture Organization, United Nations Development Program, United Nations Environmental Program, the World Health Organization and representatives of governments, civil society, private sector and scientific institutions from around the world. The International Federation of Organic Agriculture Movements (IFOAM) participated in the steering committee of the process. The main objective of the IAASTD was to provide information for decision makers on how to structure agricultural research and development to cope with current and future challenges. The IAASTD is a scientific assessment similar to the Intergovernmental Panel on Climate Change (IPCC)

2. www.agassessment.org

Photo: Anita Deppe

in which 400 scientists from all around the world gave their input. Key challenges were identified as well as options for action for the future of farming.

The IAASTD was guided by a broad set of goals: 'the reduction of hunger and poverty, the improvement of rural livelihoods and human health, and facilitating equitable, socially, environmentally and economically sustainable development.' The challenge was to simultaneously meet development and sustainability goals while at the same time increasing agricultural production. The IAASTD report is a call for governments and international agencies to redirect and increase their funding towards a revolution in agriculture that is firmly agro-ecological. The core message of the final IAASTD report is the urgent need to move away from destructive and chemical-dependent industrial agriculture and to adopt environmental modern farming methods that champion biodiversity and benefit local communities. More and better food can be produced without destroying rural livelihoods or natural resources. Local, socially and environmentally responsible methods are the solution. The IAASTD also concluded that such techniques as genetic engineering are no solution for soaring food prices, hunger and poverty.

In the research paper 'Organic Agriculture and the Global Food Supply'[3] Badgley et al., from the University of Michigan focus on productivity of Organic Agriculture through a scenario study, comparing yields of organic versus conventional or low-intensive food production, for a global dataset of almost 300 examples, and estimated the average yield ratio in 10 food categories for the developed and the developing world. They also estimated the amount of nitrogen potentially available from fixation by leguminous cover crops used as fertilizer from studies in tropical and temperate regions. For most food categories, the average yield ratio was slightly <1.0 for studies in the developed world and >1.0 for studies in the developing world. The average yield ratios were used to model the global food supply that could be grown organically on the current agricultural land base. The resulting estimates indicate that Organic Agriculture has the potential to produce enough food on a global per capita basis to sustain the current human population without increasing the agricultural land base. In addition, estimates of nitrogen fixation from leguminous cover are sufficient to replace the amount of synthetic fertilizer currently in use. These results indicate that Organic Agriculture could contribute quite substantially to the global food supply, thereby reducing the detrimental environmental impacts of conventional agriculture.

The FAO conference on OA and food security, May 2007[4] aimed to identify Organic Agriculture's potential and limits in addressing the food security challenge, including conditions required for its success through the analysis of existing information in different agro-ecological areas of the world. The Conference discussed four issues related to food security: food availability, food access, food stability and food utilization. In conclusion, Organic Agriculture is presented as a "neo-traditional food system" as it merges science and traditional farming practices. It has the potential to contribute to sustainable food security through improved household nutrient intake, contribution to transitional food emergency situations, and contribution to healthy diets. It also serves as a national employer through employment generation in rural areas, and can provide global environmental services, while being challenged to help mitigate climate change. The report states that organic food systems ought to be evaluated in a wide development context including conventional agriculture's detrimental impact on the environment (e.g. land degradation, water pollution, GHG emissions, biodiversity extinction and environmental services erosion) and on rural societies (e.g. disenfranchised farmers and discredited agriculture and knowledge). Although Organic Agriculture is not a panacea and has its own limits in addressing challenges posed by modern lifestyle, its external environmental costs are much lower than those of conventional agriculture and, in some areas, it can reverse problems of natural degradation. Moreover, non-certified organic systems increase food availability and access exactly in those locations where poverty and hunger are most severe. Increased food performance in developing countries, through conversion of subsistence systems to organic management, is a viable option. The challenge is neither agronomic nor economic but socio-political.' Therefore political will is needed to recognize the interconnectedness between the so-called food crisis, the climate crisis, and the decrease in biodiversity.

There is not one food crisis, but many failures and threats in the food producing system that make it difficult for people to access food, consequently people go hungry. By bringing back farmers, instead of external inputs, as the center of the farming strategy, Organic Agriculture restores a decision-making role to local communities, guaranteeing their right to control their own resources, and engaging their active participation in a value added food chain.

3. http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=1091304

4. www.fao.org/organicag/food_docs.jsp

Examples from the field

The Tigray project in Northern Ethiopia has succeeded in reversing the negative agricultural developments, in an area once severely affected by problems such as soil erosion and hunger. Here, poor subsistence farmers, researchers, local advisors, agricultural experts, and the Institute for Sustainable Development have together devised a cropping system. This system is based on local inputs, biological diversity, and other ecosystem services. The project has produced a range of positive results such as higher yields, higher groundwater levels, better soil fertility, decreased susceptibility to drought, increased income, and better livelihoods.

The Institute for Integrated Rural Development (IIRD) is a premier development organization of Marathwada region in Maharashtra State in India, promoting development alternatives through the initiatives of groups of rural poor. By making a pledge not to use chemical inputs women farmers can enroll into a conversion, mentored by already converted farmers. They (re)learn indigenous techniques for producing a variety of foods for local consumption. The surplus is marketed at a regional organic bazaar and the organic production is guaranteed through a participatory guarantee system. Instead of producing e.g. cotton and being dependent on middle men for input and prices, they now have control over their most basic needs: healthy food.

The National Association for Organic Producers in Peru, ANPE, represents over 12000 small holders who decided to work only with Organic Agriculture methods. It is a grassroots organization with 22 regional associations building from the local to the national level. The work focuses on the dissemination and implementation of the Principles of Organic Agriculture, local organic market development built on small holder and consumer participation, and public advocacy through strategic alliances with public and private organizations. A major emphasis has been the work on Biodiversity Flagship Products, such as Peruvian native potatoes, grains and fruits; cultivated with an agroecological approach. The added value given to these native organic products with local processing methods while preserving culture, tradition, indigenous knowledge, and culinary arts has significantly contributed to food security and sovereignty in an area which is considered the poorest rural area in Peru.