

SUSTAINABLE AGRICULTURE AND AGRICULTURAL DEVELOPMENT

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Until recently, the meaning of agricultural development has been linked with the transformation of agriculture from the traditional to the modern way of life. The aim was -and it continues to be in many countries of the world- to increase production through developing agricultural technology and using technological achievements of agricultural science. In the process of development the agents of agricultural research were constantly in vigilance and they got ready to preparing what extension had transmitted to them. On the other hand, extension transferred research results to the farmers, whom it advised and instructed how to make efficient use of them.

However, under the issues of equity, employment, land tenure and issues of political economy in general, questions on «what is the cost for the future generations in our endeavour to achieve accelerated development» and «who benefits and for how long of this development» have been raised. Without overlooking the fact that many technologies are judged today with scepticism, as for their advisability, their importance and their expected efficacy (e.g. the expansion of mechanisation in Greek agriculture calls it in question). Moreover, because programme development' impact was measured in terms of number of farmers adopting new farm practices, the linkages between research, extension, and the farmers became a major preoccupation. Yet, the focus on farming systems analysis, on farmers' participation in decision making processes and the linking of many components of development mix all these have changed views about the concept and the importance of agricultural development outcome, to the point that farmers today be considered as «having a better understanding of their problems» and that «they are very often right».

Today we are in the condition that agriculture needs to meet all challenges set, having further the mission to become sustainable.

Agriculture and quality of life

The well-known Green Revolution in the mid-sixties by which it was pursued the

Abstract

Modes of agricultural production in the Third World countries have caused many problems especially those of socio-economic differentiation, since large scale farmers have mostly benefited from the introduction of agricultural technology. In the industrialised countries of the world technological progress in agriculture resulted, besides the problem of over production and the reduction of prices of agricultural products, in environmental problems, impoverishment of biological diversity, depopulation of rural communities and degradation of quality of life in general. As a consequence increasing attention is nowadays devoted to the concepts of sustainable agriculture and sustainable development.

Extension has a critical role to play in that case. Its strategies should rely on holistic approaches, on co-operation and co-ordination of all agencies directly or indirectly involved. The contribution of indigenous knowledge and farmers' active participation should take precedence over others in extension programmes.

Résumé

Les modalités de la production agricole dans les pays du Tiers Monde ont engendré un grand nombre de problèmes, en particulier au niveau de la différenciation socio-économique, car les grands agriculteurs ont profité le plus de l'introduction des technologies agricoles. Dans les pays industrialisés, le progrès technologiques dans l'agriculture, a créé, en plus des problèmes de surproduction et de baisse des prix des produits agricoles, aussi des problèmes à l'environnement, par un appauvrissement de la diversité biologique, l'exode des communautés rurales et une moindre qualité de vie en général. Par conséquent, une attention de plus en plus croissante est dédiée, aujourd'hui, aux concepts d'agriculture durable et de développement durable.

Dans un tel contexte, la vulgarisation joue un rôle critique. Ses stratégies devraient se baser sur des approches holistiques, sur la coopération et la coordination de tous les organismes directement ou indirectement intéressés. L'apport de connaissance de la population indigène et la participation active des agriculteurs devraient avoir la priorité sur les autres dans les programmes de vulgarisation.

covering of food demands of the population in the Third World countries through high yielding varieties, brought spectacular results at the beginning of its practice - even tripling the yields in some countries, while it managed to secure self-sufficiency of food in some others. Yet, while poor farmers' incomes were increased at 50% in average, the incomes of rich farmers were tripled. Taking into consideration that new seed varieties were connected with an increase of inputs use, it became clear that the disadvantaged farmers were very soon confronted with problems of production, so that they gradually started to achieve diminishing real incomes than previously. A great number of these farmers were forced to get into debt and afterwards to sell their lands to the big farmers in order to meet their financial obligations.

Present modes of agricultural production in the industrialised countries, with the aim to increasing economic benefits and covering the increased demands in goods, have caused pollution of the agricultural and human environment in general, depletion of soil and water resources, impoverishment of biological diversity, contamination of food with pesticide residues and depopulation of rural communities. The desertification of agricultural lands and the pollution of ground water were never higher before. The over exhaustion of soil resources has

already led to the desertification of a great part of the Mediterranean Basin (GEOTEE, 1993). Unexpected climatic changes, flood, drought, etc. have affected human life especially that of rural people, so the far-reaching repercussions on ecosystems and on human societies are too much intense that in many cases they became uncontrolled.

Economic development measured with the criteria of static, technological and of narrow context, was far from improving human conditions. Quality of life has been downgraded dangerously, water and air are polluted increasingly, health is seriously threatened, economy is irreparably harmed, social tension is enlarged. Resources sustainability, a principle held in the early decades of this age and being ignored after the Second World War, began to rise as a new aim (Yassoglou, 1993).

Problems today are more complex and interwoven to have fast and ease solutions. The exhaustion of resources, still to the benefit of a few farmers, rises today a point of their immediate conservation. It brings out the necessity of sustainable agriculture and sustainable agricultural development. Extension has a critical role to play in that case, by redefining its tasks and participating actively in sustainable development programmes and sustainable agriculture.

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Sustainable agriculture

Sustainable agriculture is best defined as being ecologically sound, economically viable, socially just and human (International Alliance for Sustainable Agriculture). Forms of agriculture that do not meet these requirements sooner or later will be abandoned, since in the short-run or in the long-run, degradation or destruction of the ecosystems and natural resources, poor economic outcomes, mass discontent that will unavoidably lead to social explosion will result.

The Technical Advisory Committee of the CGIAR (Consultative Group on International Agricultural Research) suggest that sustainable agriculture should «involve the successful management of resources for agriculture to satisfy human needs while maintaining or enhancing the quality of the environment and conserving natural resources (TAC, 1978).

A simpler definition regards sustainable agriculture as a «productive system that enables us to derive continuing benefits from the use of land, water, genetic resources, etc. to meet current needs without destroying the natural resource base for the next generations» (Castillo, 1992).

Examples on sustainability, either from economic or ecological facets are those concerning the techniques of fallow land and crops rotation, to which farmers resort in order to facilitate cultivated with annual crops land to keep or to replace, after a period of time, its natural productive potential. As opposed to this, intensive farming on the same plots of land continuously, and in particular with the same cropping pattern, will gradually lead to the exhaustion of soil resources, to yields' reduction and to a decrease of farmers' incomes.

Typical is the example of the integrated pest management, by which is intended to eliminate all pests of a particular crop while minimising the cost of the pesticides used or reducing the male population of insects to a minimal possible limit through sterilisation techniques, or finally, by utilising optionally deadly genes that cause insects' death indirectly and only under certain conditions. Opposed to this, the continuous and uncontrolled use of chemicals has gradually led to the drugs habituation of microorganisms, of insects, etc. and eventually to the need of an increased use of more effective pesticides and hence an aggravation of the environment and health of human beings. In forestry management, sustainability reflects the principle of an invariable and continuous exploitation of forest products and by extension the principle of forest conservation. The principle of a «strictly sustainable forest» has been formulated during the early decades of the previous age as a result of the industrial revolution and of an increased demand in timber got through a systematic felling, without, however, reducing woody areas.



Agroforestry attempts to keep a balance between woody and plant vegetation; so, in the tropical forest of the Amazon it is pursued the minimum trees' density that they will avert a desertification, through both preventing soil erosion and supplying organic substances, while on the other hand plantations enrich the soil with substantial components that tend to run out as a result of their transfer to enormous mass of the rain forest.

Some researchers see that the only way to sustainable agriculture is to shift to what is commonly called agroecologic systems. The focus is on developing food production systems that enhance human quality of life as well as environmental balance. As the actions in the industrialised countries affect economic, social and environmental conditions, the world over, agroecologists apply a global perspective in their operationalisation of sustainability.

Other researchers believe that biotechnology and computer technology will give the tools needed to develop sustainable agricultural systems. Therefore, while agroecologists will primarily strive for a better understanding of and coexistence with the larger ecological systems, the high-technology people most often will aim at improving extensionists' controls of agricultural production.

The answer to what approach is mostly proper to promote sustainable agriculture depends on human values and beliefs, the environment and the role of technology and science. Questions such as: Do we see man as part of or master of nature? To what extent do we believe we can successfully control the larger ecological systems on the basis of scientific knowledge? What right do we have to exploit natural resources when considering the needs of the Third World

population and future generations? What role do we assign to agricultural production? Do we see it mainly as a means for producing cheap food or is it an integrated part of society including cultural diversity and other aspects of human quality of life? are of crucial importance.

There are various aspects of what constitutes sustainability and sustainable agriculture. Fernandez (1992) proposes a framework, in which sustainable agriculture must bear the following features: it must be economically viable; ecologically sound; socially just and humane (respects human, dignity, participatory, and equitable); culturally appropriate (respects traditions, values, beliefs and culture of the people); and grounded in holistic (integrative, non-reductionist) science. Kuhn (1992) identifies the following different uses of sustainability: a) It keeps the community alive; b) It produces ecologically an acceptable production; c) It provides with a thriving economic and social order; and d) It carries its sustainability in the long-term.

Surely, since theory and practice are poles apart, it would not be sensible to consider in advance that sustainability will fail before it tested in practice. However, the following should be taken into consideration:

1. Focus on sustainable agriculture presumes in considering a system in various levels and scales. It is surely essential to a farm scale sustainability with focus on increasing production, yet insufficient to demonstrate how sustainable the «sustainable agriculture» is. The mixing and the interlinking of various components impose an extensive analysis of the system itself.
2. Synthesis of research results is needed as farming systems interact, with searching for the extent of farmers' participation in development programmes. Farming Systems Research (FSR) may constitute a basic ingredient of sustainable agriculture.
3. Indigenous knowledge should not be sought as an independent part of knowledge, even as an alternate solution, but as an indispensable part of the body of the whole knowledge. These two sub-systems of knowledge should not be competitive but complementary.

Sustainable development

Nearly three decades after accelerated agricultural development efforts worldwide, we are today faced with a critical question: Have we made gains and met the needs of the population by jeopardising the ability of future generations to meet their own needs? This a key-question because we know that much of what has been achieved in the increases in food production was accrued through the provision of chemical inputs in increasing quantities, higher water use as a result of huge investments in irrigation and by bringing new areas into cultivation. We may find many definitions of sustainable development, complementary or even

diverse ones. Some are focusing on economic stability (Cernea, 1987), others on social and cultural aspects (Arizpe, 1989) and more recently on environmental viability (Katz, 1990). A more ample definition, «... the on-going, dynamic process of continuing the valued results of development activities» (IDMC, 1987, p. iii) is being used as a basis as it encompasses economic, technological, organisational, ecological and process factors.

Sustainable development is usually defined the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. This definition contains two key concepts: On the one hand the «needs», in particular the essential needs, and the world's poor, to which overriding priority should be given; and the «limitations» imposed by the stage of technology and social organisation, on the environment's ability to meet present and future needs.

Vosti (1992), writing about the links between agricultural sustainability, growth and poverty alleviation as the critical triangle, identified six issues such as (Castillo, 1992): a) Any definition of sustainability must include the notion of improving the livelihood of the population that relies on the resource base in question, b) global and national environmental concerns are often incompatible with smallholder farmers' goals of increasing their incomes and feeding their families, c) the problems of environmental degradation cannot be solved only by relying on pricing policies that encourage a farmer to «value» natural resources correctly and thus protect them, d) agriculture must be more profitable in the long run in order for farmers to invest in improved agricul-

tural technologies and conservation, but profitability of agriculture alone will not solve the problems of environmental degradation, e) strategies to promote agricultural growth should simultaneously alleviate poverty and encourage the use of technologies that increase productivity while conserving soil and water resources, and f) population pressure is a major source of stress on natural resources.

The term sustainable development was devised to show that legitimate is not any development, but that which is not timely, locally and status self-refuted. Sustainable development primarily refers to its time dimension, in others words its maintenance ad infinitum. Sustainable development is that kind of development that, from economic, social and ecological view, does not incorporate elements that might later lead it into collapse. It means, that it allows the perpetuation of natural resources and the conservation of environment in conditions being able to offering human beings good offices.

Extensionists and other change agents, obviously, would need to be clear about what they want to promote and the implications in question. They must be prepared to answer questions such as: What are the short-term and long-term benefits of sustainable agricultural development? How is it going to affect farmers' incomes? How would lower profits or other hardships resulting from the practice of sustainable agricultural development?

Castillo (1992), by referring to Reijntes et al., points out that sustainable development with low external inputs helps to optimise the use of locally available resources

through combining the different components of the farm system; helps to seek ways of using external inputs only to the extent that they are needed to provide elements that are efficient in the ecosystem and to enhance available biological, physical, and human resources; and, helps to develop specific farm practices for each ecosystem by incorporating the best components of indigenous farmers' knowledge and scientific knowledge by applying the principles of ecological agriculture. Surely, sustainable agricultural development with limited external sources is not a process susceptible of a uniform reply for all circumstances and for all geographical areas.

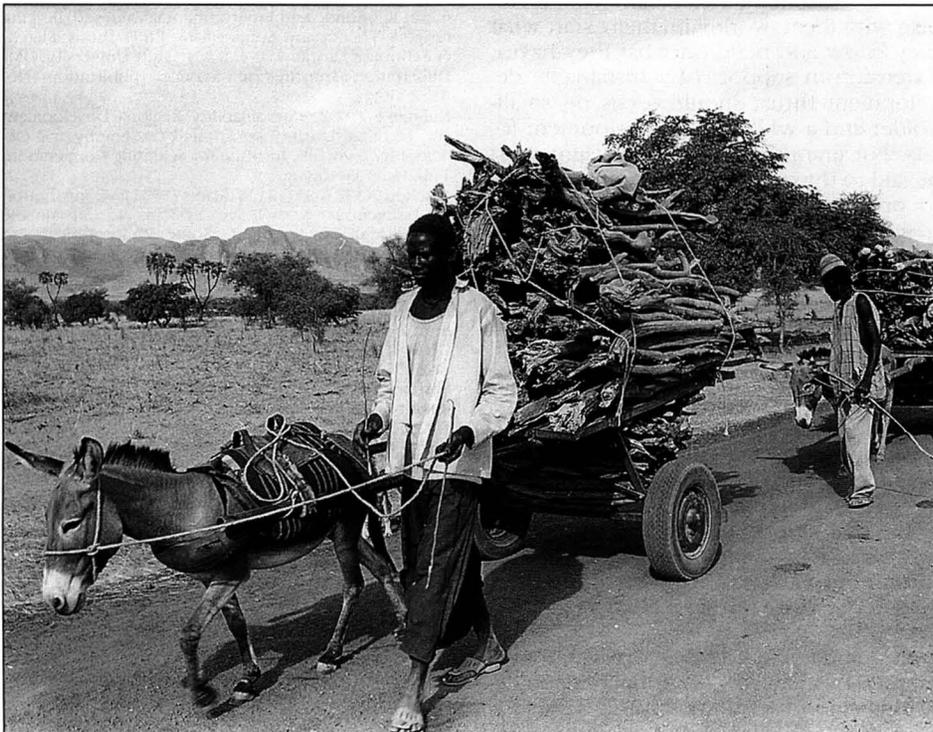
Undoubtedly, much could be achieved with intensified research and development work in certain areas. Regarding agricultural inputs, messages could emphasise correct amounts, placement, and timing so that excessive amounts do not remain in the ecosystem. Of course, there is also the added benefit of big savings in cost. These areas could possibly constitute good starting points for extension programmes.

Sustainability and extension

Most of the current levels of production are based on non-renewable, external-input based technologies. These increases have not always been the result of better management or a judicious use of available resources, but often the result of a mere infusion of external inputs, most requiring capital resources. Agents probably have not seriously coped with a situation of informing farmers on how to make decisions in a different way, so as to keep in balance the socioeconomic as well as the ecological environment. They are focusing attention on «what the things are» and not «why the things are». Therefore, sustainability is being increasingly questioned even as it is recognised that many external inputs will continue to play a role in future.

Moreover, it must be thought of that practices are not those making development sustainable, but people who hold values that include sustainability as an essential part of quality of life (Yoder, 1991). People make sustainable development successful because they choose practices that allow them to preserve and manage their resources to provide not only for themselves but for future generations.

To achieve sustainability, equal attention must be devoted to issues of survivability and empowerment for the people involved. Successful sustainable development will require a process where individuals will decide the way they fill they will benefit and improve an undesirable situation. The Agency for International Development (AID) suggests that: «Sustainability implies that designers, implementers and evaluators must give attention to the social soundness of agricultural programmes and projects. They must be responsible to the broader ob-



jectives, needs, and capabilities of the target populations who determine the direction and rates of adoption of sustainable agricultural practices (AID, 1990).

Indigenous knowledge systems are being examined by academics, development planners, and practitioners for contribution to alternative development (World Bank, 1989). Since it is believed that sustainable development and environmental management have not so much contribution to agriculture and extension education due to institutional barriers, indigenous knowledge is that to link the economic, the social, the ecological and the ethical elements. It is the knowledge that is built and developed in a specific environment, it is characterised by integrated systems of cognition, beliefs, and practices, and it provides all vital information on natural resource management ensuring sustainability. Knowledge and values creation on the basis of indigenous knowledge is a form of mental and economic decolonisation, a major contribution to individual and national self-reliance and sustainable development (Muchena and Williams, 1991).

Lack of awareness of indigenous knowledge systems, in combination with top-down approaches of technology transfer extension models characterise an irrational extension task, while on the opposite, farmers' participation, the linking of all elements and actions of various agencies can help creating a self-reliance and a sustainable agricultural development.

Agricultural extension needs to be closed to its clients in order they play a substantial role in the process of agricultural development. The farmers, of course, will bear the brunt of sustainable agricultural development in the final analysis, since they will be called upon to practice sustainable agriculture. Yet, extension will be responsible for convincing farmers of the need for such a development and for encouraging them to use recommended technologies. It is imposed that extension be involved at the beginning — that is, in the developing of the technologies — rather than at the end, when technologies are already developed and are ready for transfer.

Given the position extension occupies as the link closest to farmers, it is a tendency to blame extensionists when recommended technologies are not widely adapted. However, it must be recognised that sustainable agricultural development is a multifaceted endeavour that, in many instances, would involve action on several fronts. Therefore, the search for appropriate sustainable agricultural development strategies should rely on holistic approaches for delineating the dimensions of the problem and developing feasible solutions. (Seepersad, 1992).

Methods for the promotion of people-centred agricultural extension calls for a reassessment of the role of the extension regarding the entire process of technology introduction and the farmers' approaching

for knowledge transformation. A transmission of responsibilities from extensionists to the farmers themselves is gradually needed. Apart, the educational needs of farmers cannot be satisfied with measures covering technical subjects of general issues. Having in mind the international financial crisis, the bulk of social costs, and the downgrading of quality of life in general, a specialised socio-economic as well as an environmental information for rural people is necessary. Extension must rely its prospects to food, income and energy enhancement, on ecologically sound conditions that are not destructive of the agricultural resources. These prospects are not compromised in the long-run on the base of sustainable agricultural development. Promoted agricultural technology should conserve and enhance the resource base through the inclusion of concepts of nutrient cycling, reduction of external inputs, coordination and cooperation of all those involved in development process, etc.

Extension must consider sustainable agriculture as its key-strategy, as it is an alternative for enhancing and conserving the agriculture and natural resource base. However, it is hard to design and implement sustainable agricultural programmes given the transdisciplinary nature of sustainable agriculture itself and the difficulty of arriving at a good measure of costs and benefits, especially from ecological point of view.

The basis of designing extension development programmes constitutes what is involved in the notion of Rural Reconstruction. According to Gonsalves (1991) who referred to a Chinese philosopher (700 BC), the basis for a people-centred approach to extension is phrased as: «Go to the peasant people, live among them, learn from them, plan with them, work with them, start what they know and build on what they have». Extension in support of a sustainable development thrust should focus on smallholder and a whole farm development focus. For granted that aspect, weight must be laid to the overall number of farms than to orientation of production at national base, that will be achieved by a minority of farm population. The immediate implication for the extension system is that the front line worker would have to be a generalist rather than a specialist. This might seem as «old wine in new bottles». But, the striking reality is that the majority of the farmers have not been able to meet their basic needs nor have they been able to conserve their natural resources.

The implication of extension to sustainable development implies that it must be ready to meet misconceptions about sustainable agriculture that would be raised, with a transition from an overtly external input based system to a more resource efficient alternative.

Environment should be incorporated into support mechanisms of farmers' incomes, so this should be a substantive target of Common Agricultural Policy. Ecological

agriculture, processing of agricultural residues, the rational utilisation of pesticides and of fertilisers, the protection of biological diversity, are some of solutions to be widely applied.

The technological, economic and social development pursued through extension activities have far-reaching consequences. In this situation we are challenged to take on an educational role to promote a broader understanding of agriculture, that it will make possible for farmers as well as decision-makers to take an active part in developing sustainable agricultural systems. ●

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