

Sustainable Agriculture-Role of Small Holding Agriculture (Sha)

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Abstract

An attempt is made to impress upon one and all including agriculture scientists the necessity to support sustenance of Small Holding Farming (SHA). Even though both large holding and small holding have benefits and limitations, taking some specific examples from some developing countries and couple of developed countries it is concluded that agriculture practices by small holding farmers are essential to have sustainable agriculture, which helps in the food security especially in countries that basically depend on agriculture economy.

Keywords: Sustainable Agriculture, Small Holding Agriculture, Eco-System, Socio-Economic Aspects

Introduction

Agriculture practices vary from place to place. Even concepts and methodologies need to be changed, taking in to consideration a region's ecosystem peculiarities and socio-economic aspects. A debate is going on regarding the dimensions of landholdings, for optimum production and economic viability. After taking in to consideration the problems due to non availability of farm labour, economic non viability of labour intensive agriculture practices, per acre cost of quality seeds, pesticides and fertilisers, storage and transportation costs of farm produce from small holdings Indian agriculture experts have come to the opinion that economic viability of small holdings is poor. This is not agreed to by many other experts and small farmers. Usually, in western countries (especially in US) large holdings are in vogue. However, some studies suggest sustainable agriculture is feasible when land holdings are small. I present below some of the recent studies in US and other parts to have an insight in to the existing scenario.

Sustainable/ecological agriculture

Ecological or sustainable agriculture, as the name suggests, is a kind of farming that is sensitive to local conditions. It makes judicious use of available resources and tries to bind locally available plants, trees, birds, animals, insects and micro-organisms to interplay in a mutually beneficially fashion - one that results in nutritious, rich and chemical-free crops. An organised approach pays attention to soil fertility, agricultural biodiversity, climate mitigation and adaptation, green knowledge development, a decent living for farmers and gender inclusiveness. Sustainable agriculture can essentially be described as the practice of farming ecologically. Rather than focusing only on the economic viability of the crops, sustainable agriculture also involves using non-renewable resources effectively, growing nutritious foods and enhancing the quality of life of the farmers. Besides the obvious benefits, sustainable

farming also allows farmers to transform their farms into giant recycling centers. They can turn crop waste and animal manure into fertilizers, use crop rotation to enrich the soil and reroute rainwater to fuel the irrigation system. Not only does this save money, but it also conserves natural resources. Sustainable farming also lowers the need for chemicals and pesticides, and it makes the transition to a more organic, clean farming process a lot more feasible. It is basically aimed at stimulating green and rewarding small holder farming by supporting and scaling up promising approaches. This key focal area has three pillars: sustainable intensification, green transformation and biodiversity business.

Sustainable intensification

Sustainable intensification pillar supports activities that increase diversity and productivity at smallholder farms. Because chemical intensification is in many cases a risky short-term strategy fraught with environmental and health problems, one has to optimize the performance of ecosystem-based production using capacity development, business development services (BDS) and a more enabling environment. To achieve efficiency in the use of scarce natural resources, greater biodiversity and improved ecosystem services are crucial. These include soil fertility, pollination, pest regulation, and water holding capacity. But for this, smallholders need both technical know-how and a technical and financial support system that acknowledges and favours sustainable approaches. Making agriculture less dependent on fossil fuels is also an important element of the strategy. It is well established that an important pull factor for sustainable intensification is the demand for quality products. Both large and small companies are increasingly becoming interested in sustainability in production products for reasons of resource depletion, risk aversion and corporate social responsibility.

Green transformation

Most smallholder farmers cannot provide the investments needed to transform their agricultural systems into more climate-smart and sustainable systems with higher soil fertility and greater diversity.

As such to increase the sustainability of the agricultural system one needs to aim at highlighting the environmental services smallholder farmers do provide and laying out what is required to sustain and further improve these services. For example, farmers can benefit from payments for ecosystem services (PES). While sustainability labels such as those for organic products (indirectly) acknowledge some of these services, they only provide payments afterwards. The program further strengthens these developments with an aim to promote green transformation. Key activities include knowledge generation, strategy development and support to innovative pilots.

Biodiversity business

Some enterprising organizations are known to promote biodiversity business as a promising approach to deal with the twin challenges of sustainable biodiversity management and social development. Shade-grown organic coffee, value-added agroforestry products and the carbon-offset market are examples of commercial activities that have the potential to provide substantial biodiversity and socio-economic benefits in addition to financial returns. Supporting specifically small and medium enterprises (SMEs) in rural areas is an important development strategy. An enterprising organization's aim is to turn around the current practice, and promote conditions which favor biodiversity SMEs over non-sustainable SMEs. Biodiversity SMEs have trouble mobilizing the required investments. Through collaboration with the select banks and with Leaders for Nature (IUCN NL), an organization has aimed at its biodiversity business program to tackle bottlenecks like capital flows and create a sense of urgency for the development of biodiversity businesses (Source: Excerpts from the below web link has been used in preparing the above basic inputs <https://hivos.org/focal-area/sustainable-agriculture-biodiversity-and-climate-change-0?snid=15400>).

Basic Principle

A sustainable approach to farming is economically viable, environmentally sound, and socially beneficial: it works for the farmer, the land, and the community. Sustainable agriculture is grounded in the idea of stewardship: preserving the resources that allow us to meet our own needs, so that future generations can meet theirs too. This idea might seem too obvious to need stating, but its implications are far-reaching. If we are serious about sustainability, we cannot continue to farm in ways that deplete soil, pollute water, reduce biodiversity, and impoverish rural communities. We need a new agricultural toolkit. And farmers across America, with the help of science, are developing that toolkit. Crops require fertile soil and protection from weeds and insect pests in order to produce the food we need. Sustainable agriculture meets these requirements with sophisticated management practices grounded in the science of agro-ecology, which views farms as ecosystems made up of interacting elements—soil, water, plants, and animals—that can be modified to solve problems, maximize yields, and conserve resources.

Research has shown that agro-ecologically based methods—such as organic fertilizers, crop rotation, and cover crops—can succeed in meeting our food needs while avoiding the harmful impacts of industrial agriculture. As farmers incorporate these practices into their work, many benefits emerge: Less pollution; Healthier, more fertile soil that is less vulnerable to drought and flooding. Also it can result in a lighter impact on surrounding ecosystems and greater biodiversity, reduced global warming impact and less antibiotic and pesticide resistance.

This checklist of benefits adds up to more than the sum of its parts. The ultimate benefit of adopting sustainable agriculture is that in doing so, we make it more likely that our farms will remain healthy and productive for future generations. Ultimately, it is farmers themselves, by adopting sustainable practices, who will turn sustainable agriculture from a movement of forward-thinking innovators into standard operating procedure for U.S. food production. But consumers and policy makers have a role to play as well. Here are some things we can do: As consumers, we can vote for sustainability with our wallets at the supermarket—or better yet, at the farmers market, where the chances that our food was grown sustainably go way up. And as citizens, we can call on policy makers to increase funding for research to improve sustainable practices, provide incentives and support for farmers to adopt or expand their use, and invest in local and regional food systems, which connect farmers with consumers while creating jobs and stimulating rural economies. The current system is the result of policy choices—and we will need to make better policy choices to move that system in a new direction. (Source: Excerpts from the web link http://www.ucsusa.org/our-work/food-agriculture/solutions/advance-sustainable-agriculture#.VLUX_CuUcik)

Smallholder agriculture: what is its future and how will it affect ecology?

Tim G Benton and other experts have vividly covered this topic to properly project the importance of Small Holding Agriculture (SHA). Some of the important excerpts from his write up are detailed below.

(Source: https://www.researchgate.net/post/Smallholder_agriculture_what_is_its_future_and_how_will_it_affect_ecology).

Smallholder farm, which is also known as family farm, has been defined in different ways. But the most familiar measure is farm size. Several sources define small farms as those with less than 2 ha of crop land. Some define small farms as those depending on household members for most of the labour or those with a subsistence orientation, in which the primary aim of the farm is to produce the majority of the consumption of staple foods for the household. And others describe small farms as those with limited resources including land, capital, skills and labour. According to the World Bank's Rural Development Strategy, smallholders are defined as those with a low asset base, operating less than 2 ha of cropland (World Bank, 2003), and an FAO study defines smallholders as farmers with limited resource endowments, relative to other farmers in the sector. To conclude, all the definitions mentioned above are revolving around two central points, that are farm size (< 2 ha) and labour source (family).

Smallholder farming is a major source of food production and income for the global rural population in general, especially in the developing world. As many as 2.1-2.5 billion people are involved in farming smallholdings and there are perhaps 500 million smallholdings in the world (FAO 2010; IFAD & UNEP 2013). Most of the global increase in population size in future will occur in sub-Saharan Africa and South Asia, where food insecurity is rife and more than a third of agricultural land is composed of smallholdings (FAO 2013). For their own food security, production growth needs to rise radically to feed the growing populations, and, it is hoped, help the dietary transition to a more nutritious (rather than subsistence) diet as the countries develop economically. Smallholder agriculture (SHA) is therefore an important focus of development workers with a view

to helping smallholders increase yields and incomes.

In addition to the livelihood necessity of SHA, many ecologists recognize that it is also often (but not always) beneficial for ecosystem service provision, often because it creates habitat heterogeneity and forms part of a semi-natural landscape. But, smallholding is hard labour and typically low yielding. Making a smallholding high-yielding won't provide income levels that the western world would see as economically desirable or viable. Thus, if economic development of SH areas happens, there is an implicit need for consolidation of landholdings to ones that are capable of providing the sort of incomes that we take for granted. To what extent can this be done without losing the benefits – social and ecological – of SHA? To make it stark, one development Agent pointed out that the existence of SHA implies a life of labour and poverty and his job is done when it is extinct. Is the “sustainable intensification” of smallholder agriculture possible in a way that preserves the environment and provides income and food sufficient to meet the needs of the people? Different opinions emerged. Some are reproduced below, to find a viable solution.

- SHA agriculture is the bedrock of economic development in a typical developing nation, Nigeria as an example. It supplies food and employment for a large proportion of the populace. Several studies have affirmed the higher productivity of these methods over commercial or and large scale farming. The SHA farmers are recognized by their ability to minimize waste and produce at a higher rate than large scale farm holdings. Commercial large scale agriculture may therefore not be a substitute for SHA if the goal of economic development in these countries is of paramount interest. However, we have to look more into the direction of empowering these farmers and making them into cooperatives to enhance their bargaining power and give them better returns to their farming activities.
- An adaptive approach still provides a fundamental framework for the implementation and adaptation of land management and policies over time as more information is collected. A crucial issue then could be developing landscape planning (e.g., restoration) that might make landscape condition sustainable in face of unpredictable disturbance and change. Land sharing involves the adoption of biodiversity-based agricultural practices, learning from traditional farming practices, transformation of conventional agriculture into organic agriculture and of “simple” crops and pastures into agro-forestry systems. Some existing smallholder farming systems already have high water-, nutrient-, and energy-use efficiencies and conserve resources and biodiversity without losing yield. Any person/organization/ government wanting to eliminate SHA clearly understand costs but not values. Unfortunately, the externalized cost system has been practiced for so long that many people think that it is the proper evaluation of a system. We now have the situation where Green House Gas (GHG) emissions are becoming the only criterion for production while ignoring the knock-on effects of people moving into cities etc. Unfortunately, those in policy making/implementation have mostly not taken on board the need for a holistic evaluation of all agricultural systems.
- The resilience of smallholder agriculture has been proved through time. It is important to note that it is the form of agriculture management that guarantees success and risk management. That's why smallholder agriculture is still present in all the world. The future of this kind of agriculture is then clear. It will be the dominant form of agriculture in the world. But, the problem is how everybody, including the governments, must take into account the reality that smallholder agriculture will be the main food provider to the humanity. Then, we have to do our best to encourage the persons involved in this activity by helping them enjoy their life, exit from poverty, especially chronic poverty. If not, they will be oblige to destroy our environment (ecology, biodiversity, ...) in order to produce food for us, through a non-sustainable practice.
- SHA has been considered as the main sources of gene for breeding programs which have developed high yielding varieties even in the developed countries. Low yield of the SHA is a narrow vision if we compare it with sole crops yield. In the SHA productivity must be evaluated as a system. Interactions are so many and few of them are depleting natural resources.
- Sustainable intensification of smallholder agriculture is possible, as has been demonstrated in several cases when the system is considered as the “production unit” and not the individual crops within it. Breeders, Agronomist and other scientists working together to develop improved and highly productive cropping systems, will make the difference. The strategy to promote and introduce mono crop systems in Sub-Saharan Africa to increase productivity with high yielding varieties and high use of fertilizers, will seriously affect the soil fertility, as it is being depleted dramatically, and the production of food for the next generations will be seriously affected.
- SHA is mostly involving local-community engagement and cooperation. They work together to share and fulfill their need as much as they can. So, SHA relatively engages much more social participation compared to that of industrial/commercial agriculture. Local innovation and local wisdom, which closely correlated with their local environment always involve in their works. So, sustainable SHA will gain good effect in ecological sustainability.
- One of the main “limitations” of SHA is our frame of mind (prejudice??), whereby SHA is often associated, if not attributed, to poor condition, developing economy, limited resources, marginal etc. Referring to the different inputs so far, most if not all, recognized the benefit of SHA in the bigger picture. It is unfortunately that once “development” sets in SHA tends to regress. Then we need to upgrade SHA that will ensure its survival.
- Small holding agriculture is a common practice in the mountainous regions and it is one of the major sources of livelihood for the poor hill people. In the Himalayan region, above 70% working population is engaged in this practice as the terrain does not permit for the large holdings. Simultaneously, small holding agriculture in the Himalayan region is characterized by the high agro-biodiversity as there are more than 12 crops grown together at a given time and space and it maintains the food security and ecology. Small holding agriculture is synonymous of high agro-biodiversity therefore it has greater impact on ecology and food security.

- Small holding farmers play crucial role in sustaining food security ranging from household, community, local, regional, national and perhaps global levels. However, they are facing many challenges e.g. poor knowledge on good farming practices, lack of capital for buying production inputs, limited land ownership, and now they are being most vulnerable group to climate change. To overcome this constraint, we may promote sustainable agriculture particularly towards organic agriculture as this can help maintain ecological balance. Sustainable intensification is sound concept but we need to ensure that all farming activities are carried out in environmentally friendly manner. Putting small land holdings into one piece of land may be possible in principle but in practice it is difficult as people may prefer to have individual or family land ownership. Because small landholders perceive land is life.
- All these farmers (from different parts of the world) have to be dealt with differently with policies, programs, market development and extension services and of course right type of institutions. Thus context specific solutions are needed. But there is no capacity to develop such solutions at the local levels. The closest we come to this is developing national strategy for the countries to show how to develop their smallholder sector through available data and some proven analytical techniques that will help policy makers to see evidence needed for policy making. But the real challenge is to take the broad policy guidelines to next level to address the challenges farmers face in their situation. We have a long way to go on this decentralized capacity development. This cannot be done by external experts. Countries need to invest in such capacity - and the extension systems need to be given serious revamping with social entrepreneurship focus. Separating people from the land is a serious social and ecological mistake. Agri business OR small holder is a false dichotomy. Making commercial AND small holder farming viable with improved appropriate technology, mechanization and policy would better serve a 'sustainability' agenda. Many smallholder farmers are proud and glad to be independent and it is not correct to think "progress" or "development" should be defined by Western standards. SHA should not be labour and poverty. But, one should not say that SHA should be extinct. Food security will definitely go out of the window for many if we run down that path also. So, we must focus on some of the really big issues: - How to increase productivity and also improve access and distribution? - What affordable technologies can reduce some of the labour intensity and allow time for other things including productive activities? - How can value-added products be added to the SHA value chain without replacing food? Food crops alone aren't viable and cash crops alone aren't viable either.
- The above interactions clearly point out that we need to support SHA, by introducing sustainable practices.

How exactly can you turn your farm into a sustainable one?

It all starts with a few conscious changes. Crop rotation is probably the oldest and simplest system used to maintain the health of soil. According to the experts, one of crop rotation's biggest advantages is that it can prevent the transmission of disease. To help protect their crops against disease and pests, farmers can plant variations of the same species, getting seeds from different growers to ensure small but important differences among the plants. These variations ensure

genetic diversity, which makes the crops stronger. Integrated pest management is just what the name implies keeping your farm's soil healthy is essential, as crops get most of their nutrients directly from the soil. In fact, according to the National Sustainable Agriculture Information Service, farm sustainability depends more on soil than on any other factor, including human help and intervention. Managed grazing is basically a livestock rotation that moves animals to graze in different areas. Managed grazing also helps with weed control and soil fertility: The manure left behind will serve as a natural fertilizer. While this might be impractical for large farms, smaller crops can easily be taken care of without the use of chemicals. Hand removal is labour intensive and usually only reserved for specific areas machines can't reach or where the crops are too fragile. Most of the physical removal of weeds is done through the use of agricultural machinery or tools. There are two major problems in water management in farms: the poor performance of irrigation systems and water waste. The best way to manage water usage in farms is to choose native crops, since these will be more used to the local weather and able to stand longer periods without rain. Selecting drought-tolerant crops is also key for farmers who live in dry areas. Limited irrigation is a practical solution for sustainable farming. Mulch and other cover crops can help retain water so the soil stays moist longer. It's also possible to set up a system that collects rainwater and feeds it into the irrigation system. Some farms even set up recycling systems so they can reuse municipal waste water for irrigation. Grow and sell in the same town, and you won't have to worry about the pollution created by having to transport, package and store crops. Growing and buying locally is key to sustainability, as it enriches the community, minimizes energy consumption, and protects air and soil quality. While solar and wind energy are well known, there are many other ways to harness energy from alternative sources. Bio fuels are another clean source of energy. Biodiesel, for example, can be manufactured from cottonseed oil, and it's not only a cheap source of energy, but also a very clean one.

What future for small farmers in India?

While it is emphasized clearly in the previous sub sections of this write up the necessity to sustain small farmers in chronically suffering Africa and other developing countries, it is palpably noticed that Indian small farmers are facing hardship in ensuring round the year availability of their minimum needs, forcing the experts to come to a conclusion that SHA is not viable in India. According to me such a conclusion is very negative and detrimental for the agriculture bases Indian economy.

Food prices, whether high or low seem like a double-edged sword: they hurt either consumers or producers. The false dilemma of which group to support (in practice often leading governments to have an urban bias) can be solved through policies and market interventions that enable both poor consumers and producers to cope in periods of price fluctuations. Unfortunately, such policies are not in the hands of more than 70 % of small and marginal farmers (who are falsely lulled into an artificial security by the sops given regularly by each and every government) and equal number of small income group consumers.

The consequence of all this directly impacts small farmers, who bear the brunt of global price declines and distorted competition and are, compelled to abandon their farming and take refuge in big cities in search of employment. Thus the most important concern is

that food production and processing being governed by economies of small farm livelihoods have been exposed as unviable. In countries like India this means about 50 percent of its population.

The overwhelming majority of these farmers are small farmers, and agricultural labourers. They have moved out of a situation where they were actually paid in kind, and a survival economy, which gave them a substantial portion of their nutrition from foraging, other diverse forms of income and food in the complex rural economy, to a modern regime which alienates them from creative survival, and renders them destitute. Often such a shift has been facilitated by so called anti-poverty programmes or food security programmes like the 2 rupee rice scheme (convert price in USD per kilo), as small farmers were lured into modern crop production for cash, which enabled them to access the food subsidy. Simultaneously, there has been a kind of disincentivising of the poor man's hardy crops like minor millet, by emphasising only main crops like rice, and wheat, or cash crops like cotton, flowers and the like.

Apart from the necessary immediate reliefs in crisis areas, through write off of loans/interest, and appropriate Minimum Support Prices for agricultural produce, there is urgent need for a planned and vigorous promotion of low-cost, low-risk, high nutrition, holistic and sustainable farming systems to reinvigorate Indian agriculture, and to stem the rising tide of farmers' indebtedness, distress and suicides.

It is the experience of increasingly large numbers of farmers that holistic farming systems, based on scientifically proven techniques, are a very successful remedy to the economic and ecological crises engendered by green revolution technology. Holistic farming systems rely on available natural resources and rebuild the ecological capital on which all agriculture is dependent. They also greatly reduce or totally eliminate the dependence of farmers on the purchase of expensive external inputs such as seeds, fertilizers, pesticides and herbicides.

Particularly for rain fed farming and horticulture, which cover at least 60% of our cultivated land, holistic farming should be adopted on a large scale without fear of loss of production. Depending on the extent of prior damage by chemical-intensive monocultures, there is some drop in productivity in the transition phase if adequate biological inputs are unavailable. But within 2 to 3 years, the system is equally, or more, productive than other systems – and on an improving and sustainable growth path. This has been scientifically validated internationally by FAO reports, and by ICRISAT. (Source: Some excerpts from an article Agriculture, food and small farmer in India, An overview, Centre for Education and Documentation, 07 / 2009; [HTTP://BASE.D-P-H.INFO/EN/FICHES/DPH/FICHE-DPH-8104.HTML](http://BASE.D-P-H.INFO/EN/FICHES/DPH/FICHE-DPH-8104.HTML))

Conclusion

Even though small and marginal farmers are known to face problems in having assured and sustainable development, SHA usage cannot be termed as non productive. It is paramount to find apt solutions to make this sector viable. If we kill SHA the rural structure will be completely damaged, leading to unprecedented chaos [1-9].

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