**Sustainable Farming Systems for Food and Nutrition Security**

**Collection of contributions received**

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# Topic note

The [2015 Sustainable Development Goals](https://sustainabledevelopment.un.org/?menu=1300) and the [UN Decade of Action on Nutrition](http://www.who.int/nutrition/decade-of-action/en/) call on all countries to end hunger and prevent malnutrition in all its forms by 2030. This is quite a challenge, and it is a challenge with sustainable agriculture and food systems at its very heart. The current situation does not look good however. The latest [State of Food Security and Nutrition in the World](http://www.fao.org/state-of-food-security-nutrition/en/) report estimates that in 2016 the number of chronically undernourished people actually increased to 815 million (up from 777 million in 2015).

Sustainable Development Goal 2 also sets the world targets that agricultural productivity and the incomes of small-scale food producers should double by 2030. At the same time food production systems should be sustainable, reduce their impact on ecosystems and be resilient to environmental change. But here again we are facing major challenges. The [latest evidence from advanced global crop models](http://www.pnas.org/content/114/35/9326) suggests, for example, that global yields of wheat, rice, maize and soybean will decline substantially with the predicted increase in global temperatures in the coming years.

Research has only recently begun to address the links between agriculture, food security and nutrition, and the environment. In Asia, for instance, the Sustainable and Healthy Diets in India project led by [London School of Hygiene & Tropical Medicine](https://www.lshtm.ac.uk/) calculated for the first time [greenhouse gas](https://www.ncbi.nlm.nih.gov/pubmed/28148994) and [water footprints](https://www.ncbi.nlm.nih.gov/pubmed/28215793) of food production in India and estimated the [dietary changes](https://www.ncbi.nlm.nih.gov/pubmed/28480453) required to meet future declining groundwater availability. These are among the first research efforts in South Asia to quantify the links between environmental sustainability and food and nutrition security at a time when, because of rapid urbanisation, transitions in diets and increasing populations, the food system is under increasing pressure.

Another example is the [LANSA programme](http://lansasouthasia.org/content/about-us), which is working with local communities in Afghanistan, Bangladesh, Pakistan and to identify farming system interventions that address [community nutritional inadequacies](https://link.springer.com/epdf/10.1007/s12571-017-0721-z?author_access_token=yJKH3tu4HM_8KWFYspeGafe4RwlQNchNByi7wbcMAY6mGzKDDvBRTvx8T6cPRHJQsYbBjC1BUpG1cVWPVxymQmcxs7YBSlHYCKhcZEGxgcbPO69o82Av0OlCNUhFZ0xhyqw4UqGzaLkGl8m5exvT7Q%3D%3D), [reduce environmental impacts](http://lansasouthasia.org/blog/urine-biochar-fertilizer-would-bangladeshi-farmers-accept-it) and also [increase resilience](http://lansasouthasia.org/blog/%E2%80%9Cwhy%E2%80%9D-%E2%80%9Clet%E2%80%99s-work%E2%80%9D-kitchen-gardens) to environmental stressors. These are important first steps in the generation of novel evidence to help meet current and future agricultural system challenges.

A [recent review](http://www.sciencedirect.com/science/article/pii/S0306919216300264?via%3Dihub) found that there are a large number of studies on the impacts of agricultural interventions on nutrition in South Asia. But, more research is required to help reduce the impact of agriculture on the environment, and build the resilience of local farming systems to current and future environmental change – this will be critical to ensuring food security and good nutrition for all.

Against this background, the discussion aims to strengthen LANSA research understanding on sustainable farming systems for nutrition security. The discussion also provides opportunity to showcase experiences and on-going research from low and middle-income countries on the links between agriculture, nutrition and the environment.

Questions for the 3-week discussion include:

1. Are you documenting the impact of the farming system on the environment?
2. Are you conducting any research on the impact of agriculture and environment on food and nutrition security?
3. Have you had any experiences of linking research and policy regarding sustainable agricultural systems for nutrition?
4. What interventions do you think are needed to increase the agriculture sector resilience to environmental stressors, especially among smallholder farmers?

Our focus is specifically on low and middle income countries where the impacts of environmental stress on food and nutrition security are projected to be the most severe. We hope that you find this topic and these questions stimulating, and invite you to share your experiences. We look forward to hearing from you.

**Lead Facilitator:**

Alan Dangour, Reader in Food and Nutrition for Global Health at the London School of Hygiene and Tropical Medicine and Nutrition-sensitive Agriculture Pillar lead for LANSA Consortium

**Co-facilitators:**

Aliza Pradhan, Agronomist and Coordinator of the M S Swaminathan Research Foundation Farming System for Nutrition study in India under LANSA

Md. Sirajul Islam, Programme Head of Agriculture and Food Security Programme, BRAC Bangladesh and Agriculture Expert for Agricultural Value Chain Study under LANSA

# Contributions received

## Naveen Paudyal, UNICEF, Nepal

Response for Q1: UNICEF as organisation has no mandate to document impact of farming system on environment, however, as lead agency for Multi Sector Nutrition Plan (MSNP) in Nepal, it influences policy decisions based on understanding over the global development in this areas in order to link agriculture intervention, environment and its impact in nutritional outcomes.

Response to Q 2: Not yet

Response to Q3: Multi Sector Nutrition Plan (MSNP) with component of agriculture is developed base on the available research/ study at global and national level. However, sustainable agriculture system for nutrition is new area for country context in Nepal. Thanks to Agriculture and Health pathway to Nutrition (AHN) academy held in this year in Nepal, this new issue entered into Nepal for further discussion.

Response to Q4: Mountainous country like Nepal is facing big challenge due to climate change. Frequent landslide and flood is increasing day by day, mainly due to deforestation and climate change. Cropping pattern are the most affected one due to agriculture production is not at the same level as it was last two decades ago. Lands are fragmented due to property transfer system among the family members from one generation to another. With the urbanisation, cultivable land is squeezing rapidly. Due to the condition mentioned above, small farmers are running away from the farming system and mostly migrated abroad for the cheap labor work. There is ample opportunity to do sustainable farming in the field of herbal medicine in Nepal, which can be cash crop for the poor families. However, investment in this area and capacity building effort is less in this area.

## Anil Kumar, M.S. Swaminathan Research Foundation, India

I am delighted to join you all in this discussion, thanks to the SDG 2030 agenda for this opportunity, and FAO and other several organizations like SUN, BCFN Foundation, and Food Tank for getting flooded with so much information and calls to action in achieving sustainable food production and consumption.

It’s a well known fact that the impacts of farming system on health of both the environment and humans appear wide-ranging across the socio-political-economic and cultural systems of the world. To my knowledge, documentation of these impacts across the value chain of the system is quite often lacking, even in the developed countries. The life-cycle approach to study the impacts, in particular on biodiversity, water and climate with reference to every major food crop and food system is absolutely essential to promote food sustainability. The south Asian countries, that growing with the biggest undernourished populations in the world need to double or triple their current efforts to achieve the zero hunger challenge goal by 2030 by keeping the food system sustainability at the central place.

In India, MSSRF- a partner in the LANSA program is involved in understanding the impacts of food production on the environment, especially on water, carbon and biodiversity in some of the hunger spots of the country. We adopt a three pronged approach-research to understand the real causes; capacity building of the key-actors including policy advocacy, and on-the ground model building in promoting location specific and sustainable farming systems for nutrition and livelihoods. The first and foremost aspect in making the FSN intervention effective is a trans-disciplinary approach where scientists, professionals, and practitioners from different disciplines related to food production and consumption working in tandem with the knowledgeable, but resource poor farming community men and women. All the interventions of MSSRF are taken with this approach, and also with an integrated framework of 4Cs that to ensure the sustainability dimension. The first ‘C’ is that of CONSERVATION where thrust is given to promote only biodiversity friendly farming practices at the level of genes, species and ecosystems; the second ‘C” is on promoting the CULTIVATION practices where adequate genetic diversity of the targeted crop is protected at on-farm and ensured the soil biodiversity enhancement with low-external input agricultural practices; the third ‘C’ is with regard to educating sustainable CONSUMPTION literacy with regard to nutrition and healthy food habit where food waste and food loss avoided, and finally the COMMERCE ‘C’ for promoting sustainable food markets.

We invite you to visit our websites [www.mssrf.org](http://www.mssrf.org/) and [www.mssrfcabc.res.in](http://www.mssrfcabc.res.in/) to know more about our interventions. Also submitted a readinh on the family farming heritage where the need and plan for some aspects of sustainable food production and consumption is discussed.

Thank you!

## Aliza Pradhan, co-facilitator of the discussion

Dear all !

Welcome to the ediscussion.

My name is Aliza Pradhan, I am an agronomist and coordinating the Farming System for Nutrition Study in India under the research consortium "Leveraging Agriculture for Nutrition in South Asia (LANSA).

This FSN study envisages the introduction of location-specific agricultural remedies for nutritional maladies by mainstreaming nutritional criteria in the selection of farming system components. The study is underway in two study sites; Koraput (Odisha) and Wardha (Maharashtra) where our crop interventions are focusing on increased area and productivity of nutrient rich crops such as pulses (Pigeon pea, black gram, green gram, bengal gram) and millets (finger millet, sorghum) among small and marginal farmers so that there will be increased availability of nutrient rich food per household. In addition, being climate smart crops these will help in building resilience to future environmental changes.

I will be cofacilitating the ediscussion and I will be very interested in knowing your thoughts/ experiences/feedback as well.

Best

Aliza

## Pierrette J. Cazeau, Haiti Cholera Research Funding Foundation Inc., United States of America

Good Morning All

Thank you very much for accepting my application to be a member also a great opportunity to expose our micro-economic agriculture program. Haiti Cholera Research Funding Foundation Inc is a Global Humanitarian 501 C 3 Non-Profit Organization  also ECOSOC Special. 2017

Question # 4. What interventions do you think are needed to increase the agriculture sector resilience to environmental stressors, especially among smallholder farmers?

To answer to the question

A) Major disasters have the potential to disrupt economies and go beyond the local damage to infrastructure.

B) Most business must rely to some extent on goods and services originating from other parts of the world, and most geographical area of the world will have different levels of natural disaster risk.

     1) Uninsured loss of a dollar that will be unavailable for investment and business growth.

     2) Assistant affected employees to recover for their own wellbeing

    3) Human cost as fatalities and injuries caused by natural disasters can disrupt businesses.

In conclusion our goal is to train the local population to know to discern the value of their own agriculture and this will allow them understand the necessity and importance of growing food to meet the needs of another country.

Pierrette J Cazeau, MBA, MHA, Post-Doctoral  
Global Public Health Diplomat  
President/Founder & CEO  
www.hcrff.org

## Suresh Babu, IFPRI, United States of America

We are working in few farming systems in Karnatak State of India and in sub-Saharan Africa to see how the farming system can be modified to contribute to achieve food and nutrition security. We look at how the changes in the cropping patterns and introducing new innovations can help in making the farming system more sustainable and at the same time contribute to food and nutrition security.

One of the problems in linking research and policy in the context of sustainable agricultural system - is that there is confusion even among the researchers on the terminology - some talk about farming system, others talk about agricultural system, and some others talk about food systems. Informed people do not correct this interchangeability in the same discussion, including this forum (see the title of this forum and the third question: can we stick to one concept and define it in the beginning of this forum to make the discussion meaningful- just a suggestion to the facilitators). The extension professionals are confused let alone the policy makers who have little knowledge on agriculture and nutrition. Let us first stick to one - farming, agricultural, or food system. Then let us define sustainable farming system - against which we can compare what is happening in our study area context. This will be useful for this discussion.

Resilience is highly connected to the farming systems under frequent shocks.  Not all farming system face such shocks. So jumping on resilience straight from the objectives of food security and nutrition through sustainable farming system would be rather illogical in a set of beginning questions for this discussion.  Resilience is a contextual question depending on the nature of shocks and the nature of food security it affects - and where. In the south Asian context resilience can come from increasing water use efficiency for the farming systems - a quick win but not fully taken seriously due to institutional rigidity. Where as in Southern Africa - fight against frequent droughts require resilience strategy that should go hand in hand with crop diversification and building productive assets after shocks.  Weak institutional capacity and poor governance remain major challenges in building resilience in Africa.

We should also remind ourselves that the farming system research for improving nutrition is not new - a paradigm of the 1980s and 1990s which died out slowly, as we brought in the livelihood approach to food security and nutrition in the 2000s which again died out as we are bringing in the resilience approach - in the 2010s. Shifting paradigms is itself a problem in the research and development community. There is no guarantee that the current resilience paradigm will not die out as well in few years if the fundamentals of taking these approaches to scale are not addressed. We should discuss this further.

## Sabine Gabrysch, Heidelberg University, Germany

Dear all,

happy to share into the discussion.

**Re: 2) Research of impact of ag on nut**

We are currently conducting a 4-year cluster-randomized trial in Sylhet, Bangladesh, called [Food and Agricultural Approaches to Reducing Malnutrition](https://www.klinikum.uni-heidelberg.de/FAARM.136235.0.html) (**FAARM**; [trial registration link](https://clinicaltrials.gov/ct2/show/NCT02505711)), funded by the German Ministry of Education and Research. We evaluate the impact of the [Homestead Food Production](http://www.hki.org/media-room/news/gardening-sustainable-solution-malnutrition#.V2FDv-ZK19c) program of the NGO Helen Keller International (HKI) on food security, nutrition and health. The program works with small-scale farmers training them in vegetable gardening, poultry rearing and marketing, as well as nutrition, child care and hygiene.

Soil fertility was a key constraint in FAARM home gardens, and therefore we explored the feasibility of urine-biochar as a low-cost organic fertilizer in the [Biochar-Urine Nutrient Cycling for Health](http://www.ithaka-institut.org/en/bangladesh) (**BUNCH**) study, together with HKI, JPGSPH and Ithaka Institute, funded by LANSA. The farmers produced biochar locally in soil-pit kilns from crop residues and mixed it with cow urine. It turned out to work quite well and we are now scaling up. Read more on this [LANSA Blog](http://www.lansasouthasia.org/blog/urine-biochar-fertilizer-would-bangladeshi-farmers-accept-it).

After the **flash flood** in April that destroyed the Boro rice crop in our area, we are now collecting data on how badly the families were affected, their food security situation and coping strategies. As part of FAARM, we have been collecting detailed nutrition data on a rolling basis and will thus be able to assess the effects on households and particularly on children.

**Re: 4) interventions for ag resilience to environmental stressors**

I am trained as a medical doctor and epidemiologist and not an agriculture expert, but here a few thoughts:

1. Resilience requires a **buffer**. Small-scale farmers that are barely surviving, chronically malnourished, don't have any buffer. Interventions need to improve and diversify their livelihoods and increase their production in an ecologically sustainable way, as well as offering social security mechanisms.
2. Resilience requires **diversity**. Much funding is wasted on magic bullets such as golden rice which would decrease crop diversity even more. Instead, we need to promote local varieties tolerant to drought, flood, heat, or pests even if yields are lower under ideal circumstances. (Climate change means we will rarely have ideal circumstances any more.) And we should diversify away from staples (also in research funding, CGIAR still focuses almost entirely on staples) and promote local varieties of pulses, fruit and vegetables rich in micronutrients.
3. Resilience requires **(eco)system-thinking**. Agriculture depends on soil life, pollinating insects and on predators eating pests, while agricultural fields can offer habitat and food for many species. Human agricultural activities now extend over much of the planet's surface. Instead of monocultures and toxic chemicals, we should favour agroecological methods that reconcile food production with biodiversity on which we eventually depend for human survival on this planet.

Looking forward to your thoughts on this!  :-)

Cheers,

Sabine

## Deepak Sharma, VAAGDHARA, India

Dear Friends,

Good Day,

I am really very fortunate that LANSA provided me with the great opportunity to look into the background of agriculture with the lens of system and nutrition. We as an organisation, VAAGDHARA tried to interact with the local community in Banswara district of Rajasthan, India and document their perception as system.  We also tried to look at the existing farming practices from the angle of their impact on environment linking them with different goals as stated in SDG 2030.

Our findings are associated with two approaches mostly discussed within the purview of Sustainable Consumption and Production, that are a linear model of farming and a circular model of farming. We would share our findings in separate write-up.

Our research has tried to work with farms on adapting diverse food items. Our experience in this field demands for widespread diversity in food system and linking it with the cutlivation.

In our findings, an increase in food diversity and agriculture diversity is important for building the resilience of small and marginal farmers to face environmental stressors.

## Swaran V, Indian Institute of Technology, Bombay, India

Dear all,

I am a graduate student working on 'social and environmental dynamics of coarse cereals cultivation'. Of the four questions mentioned above, my research will focus on the direct two parts to essentially come up with some output that my feed into answering the last two questions.

I am in my early stage of study and has chosen the hilly tracts of Palghar district in the state of Maharashtra, India as one of the area for field study. This region has historically (literature from early 60s have documented this) to been a hotbed of malnutrition prevalent among its predominant tribal population. Since millets formed a part of their daily diet in this rainfed area, I will try to see how the role of this cereal is being perceived by the people there. Through this I try to see any disparities between production and consumption of cereals, its resource footprint, pathways linking it with wellbeing (economic and health status).

This will be done through a mix of qualitative and quantitative methods like ethnographic study coupled with analysis of change in cropping pattern in the region. Along with Palghar, one more region will be considered for the study which is yet to be finalised. I am planning to begin my field study early next year and all your comments and opinions are welcome. Hope I can contribute more to this discussion in the following months.

Incidentally, my masters dissertation was carried out at CAbC MSSRF headed by Dr. Anilkumar on the topic 'food security and traditional knowledge under climate variability'.

Thank you,

Swaran

## Alan Dangour, co-facilitator of the discussion

Dear all,

Wonderful to see so much interest in this topic.

It would be fantastic to learn about more examples of on-going research on this important topic.

Please keep your contributions coming!

Alan

## Abdourhimou Amadou Issoufou, WASCAL, Niger

I am a PhD student from Niger republic. I am going to say something on the impact of farming system on the environment. If we look at traditional soil management practices such as *Zai*which is a practice that can trigger soil biodiversity. With a high diversity of soil biota, the soil functions increase. We have four main ecological functions: nutrient cycling, carbon sequestration, maintenance of soil structure and pest control. Just I want to demonstrate that there there is a link between soil biodiversity and soil functions. What attract soil biodiversity? It's Zai which is a farming system. To sum up, farming system impact positively the environment by sequestering carbon dioxyde which is a green house gas.

AMADOU ISSOUFOU

## Nicola Lowe, University of Central Lancashire, United Kingdom

Dear all,

Q2. Are you conducting any research on the impact of agriculture and environment on food and nutrition security?

Yes – we are interested in reducing zinc deficiency in Pakistan. Currently, deficiency is widespread with over 40% of women deficient. Most households in Pakistan consume wheat flour on a daily basis. Biofortification through crop breeding and application of zinc fertilizers can increase the concentration of zinc in wheat grain and offers a strategy to help alleviate zinc deficiency.

We are conducting research near Peshawar among a marginalised population to test the effectiveness of biofortified wheat flour for improving nutritional zinc status: <http://gtr.rcuk.ac.uk/projects?ref=BB%2FP02338X%2F1>

The flour has been milled from a strain of wheat grain, recently released in Pakistan by HarvestPlus

The protocol is registered with the ISRCTN (International Standard Registered Clinical/soCial sTudy Number) here: <http://www.isrctn.com/ISRCTN83678069>

In Pakistan, the research is coordinated and conducted by the Khyber Medical University, The Abaseen Foundation and Fauji Fertilizer Company. Please follow our project #BiZiFED on Twitter and get in touch if you have any questions.

Thanks,

The BiZiFED Team

## Kuruppacharil V. Peter, World Noni Research Foundation, India

"Sustainable farming system for food and nutrition security" is a topic of current relevance when land under farming gets reduced, irrigation water scarce, farm labour costly, incidences of pests and diseases becoming more prevalent, farmers suicide blotting civilized nations, global hunger index going down in highly populated countries like India. Gandhi the father of Indian nation called for selfsufficiency in family food and nutrition availability by making use of available space in the house, use of water and waste for farming and household members providing farm labour. Called variously as kitchen garden, backyard garden, nutrition garden and now hydroponics, aeroponics, rain shelter farming, vertical gardening etc., the sustainable farming system is providing both physical and mental health and wellness. Vegetable and fruit growing is a therapy for the aged, mentally retarded and depressed. In Ayurveda system of medical treatment, consumption of fruits and vegetables is advocated. Hidden hunger becoming a global concern, kitchen garden can play a positive role.

## Md. Kamrul Islam, Cotton Development Board, Bangladesh

Homestead gardening is an ancient practice to the farm families of Bangladesh, where the women used to grow vegetables or fruits using their own seeds. The quantity of the production as well as its contribution to family nutrition varied largely from farmer to farmer depending on the availability of land areas as well as land type. Rural farmers have little access to information and advisory services for decision making in real time. Creating an innovation platform by linking the different actors of production system including farmers, extension personnel, researcher, input dealers etc. through a simplified mobile app in local language will help farmers in decision making in real time for sustainable agriculture with improved nutrition security.

## Harish Yadav, MSME, India

Recently the Global Hunger Index has explained the condition of hunger in all over the world. Developing countries which have high growth rate have serious hunger conditions. Organic farming may reduce the cost of farming and conserve our natural resources such as water, soil and minerals.

Dr Harish Yadav

New Delhi

## Md. Sirajul Islam, co-facilitator of the discussion

Farming systems approaches invariably include crops, fisheries and live stocks and their interactive relationship within the households specially in the small and marginal household in the South Asian context. This has the uniqueness in addressing the household food consumption and nutrition. The development and fast tract diffusion of climate smart technologies can address and reduce the household vulnerabilities. We can reduce the livelihood vulnerability in climate vulnerable areas through reducing the sensitivity of any crop, fish or livestock technologies. These practices will also increase the adaptive capacity of the small households. This can be described by the following equation as described by B.M. Simpson (2016):

Livelihood vulnerability = (Exposure × Sensitivity) – Adaptive capacity

## Sania Akter Akter, Aid Organization; Bangladesh

Problem to be addressed :

Marshland area of Madaripur and Gopalgonj Districts are known as very low crop ( paddy ) yielding areas and frequent crop failure is the natural phenomenon in these areas as usually these areas are steadily being swamped by locked water body almost every time of the year. Only 5 months in a year from December to May lands come out of water when the poor farmers cultivate to get one time yearly paddy especially known as BORO Paddy and for the conventional cultivation practice and lack of proper modern agricultural know-how, technique and knowledge, the per acre paddy yielding is much less than 1 ton which is one of the lowest level in Bangladesh which is the main cause of poverty and misery of people these areas. On the other hand, if proper agriculture technology and applicable appropriate cultivation methods are used in cultivation and if people are fully conversant to modern way of crop cultivation, the yearly paddy yielding can easily be multiplied to more than 2 tons to 2.5 tons in several folds, which not only alleviate their poverty but will ensure their sustainable growth in socio-economic status. The main root causes for this problem are ignorance of local people to modern agricultural technologies, their traditional and conventional attachments, beliefs and approaches for paddy cultivation, lack of facilities to effective technology transfer to these farmers & cultivators because of the isolation and poor communication to reach the target areas, absent of government & NGOs initiatives to solve this problem & poor facilities to make people conversant to modern agricultural technologies applicable to these areas. As a result, it is often found that when people face severe crop shortage or crop failures, ultimately they pledge their arable land to affluent ones and quickly become landless and marginal farmers and transform into agriculture labor. In this way when work for agro-based labor become scarce in non-agro-period, they have to starve and ultimately migrate to urban slums for low skilled jobs and pass most inhuman and miserable lives. Thus a farmer family from this area become uprooted very quickly and go under poverty line and become enormous load to community and country as well. So, look into their problem is of urgent need on humanitarian and socio-economic perspective.

## Md. Sirajul Islam, co-facilitator of the discussion

Thanks Mr. Md. Kamrul Islam and Dr. Kuruppacharil for your inputs. There are few changes occurred during recent years on the homestead gardening. BRAC has introduced this concept of homestead gardening in a bit different way. We called it Nutri-garden. Nutri-garden is the yearlong comprehensive package of growing nutrient dense and naturally fortified fruits and vegetables by engaging rural women to enhance diet diversification and improve nutritional status in the household’s. Nutri-garden intervention offers a great potential for alleviating malnutrition and improving household food security and diversity. Nutri-gardens are established in homestead, gher/pond dyke areas and other fallow and unutilized land by which proper utilization of fallow land is being ensured and crop area is being increased. Nutri-gardens are an important source of income for rural households from sales of the garden products. Women are playing a vital role in providing better nutrition for their family by producing their own nutritious foods in Nutri-gardens.

The objectives of Nutri-garden interventions of BRAC are: 1. To improve nutritional status of households through consumption of diversified food. 2. Year round availability of at least five nutrient enriched fruits and vegetables in the households. 3. Enhance household income by engaging rural women and 4. Raising awareness for producing safe food.

Several nutrient enriched fruits and vegetables are being cultivated in Nutri-garden such as Red amaranth, Spinach, Pointed gourd, Okra, Tomato, Brinjal, Aroid, Sweet gourd, Bottle gourd, White gourd, Sponge gourd, Snake gourd, Cucumber, Long yard bean, Country bean, Carrot, Orange flashed sweet potato, Drumstick, Papaya, Guava, Banana etc.

An outcome study was conducted by BRAC about Nutri-garden from which it was found that- 5 to 14 crops was available in each Nutri-garden and about 8 crops was found in 30% Nutri-garden. Annual production is 2,130 kg/Nutri-garden/year and annual income is BDT 39,902/Nutri-garden/year (80 BDT = 1 US$).

A success story on Nutri-garden can be found following the link below: Nutri-gardening: Hosne Ara’s endeavor to success <http://baenbd.net/nutri-gardening-hosne-aras-endeavor-to-success/>

## Suresh Babu, IFPRI, United States of America

One of the areas that is often neglected in designing agricultural policies and strategies relates to the environmental and natural resource sustainability considerations. However, to achieve this it is important to understand what factors contribute the policy processes and how one can steer the process in the right direction. Our recent paper in Nigeria provides some insights. I attach the link here for the participants to access this. Comments are welcome.

<http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/131345>

## Umekulsoom Inam, Applied economics research center, Pakistan

Dear all,

Q2. Are you conducting any research on the impact of agriculture and environment on food and nutrition security?

Yes I’m working on linking food security and crop diversification across districts of Sindh. According to my findings though yield is decreasing here but availability is not the issue. Issues lie in the accessibility and adsorption of food and as food inflation and general inflation is rampant as well as no standardization or food protocol about the food quality or preparation is implemented. Moreover, absence of drinking water and sanitation facilities making the conditions worse which not only results in stunting or malnutrition even deaths and losses to the livestock and productivity.

Climate change is a biggest threat as Sindh is mostly arid and dependent on rain water. Higher temperature and low moisturize with delayed or no rain plays havoc for the people depending on crop production, livestock rearing or fishing.

## Aqleem Abbas, University of Agriculture, Peshawar, Pakistan

Everyone is familiar with the changing climate of the world. Countries are taking initiatives to minimize the effect of climate change on food security. Being a plant pathologist, we may incorporate biological agents to manage plant diseases. Fungicides and pesticides have impact on farming system as well as on environment. Moreover the fungicides give the results very quick. No doubt they are polluting the environment as well as super races of pathogens evolve. Biological agents such as Trichoderma spp, Coniothyrum spp as well as other in various formulations must be provided by the respective countries to the farmers in cheap price. The farmers will slowly become habitual to spray these biological agents on their plants. In this way thousands of beneficial species which are stabilizing the ecosystem can be saved from the toxicity of the chemicals. In the underneath of plants, we must create more completions between pathogen and biological agents so that the pathogens will not find time to infect plants as a result the yield will be boost up and will feed the growing populations. I am currently working on biological agents and find that biological agents perform well as compared to toxic synthetic fungicides. I think the environment become safer with the biological agents and if the environment would be safe, certainly the food and nutrition will be more secured. I want to explore the microbes further to gain sustainable agricultural systems.

## Deepak Sharma, VAAGDHARA, India

Dear Friends,

Good Day

We were looking for the answer to question of "What interventions do you think are needed to increase the agriculture sector resilience to environmental stressors, especially among smallholder farmers?" our experience indicates following points as important.

1. More or less policies of present day agriculture department are restrictive for diversity, mainly they focus on limited crops and varieties. Agriculture officers follows conventional extension programs which are of givers mode, not respecting farmers knowledge.

2. As for as small and marginal farmers are going through dilemma of traditional versus market controlled, nutrition oriented vis-a-vis cash generating. VAAGDHARA believes some where farmers need dual approach of nutrition sensitive farming with market approach, taking benefit of community awareness about the fresh and chemical free food.

3. There is need for strengthening a network of farmers led institutional platforms which will have interactive farming, research, education, and marketing. Unfortunately present day agriculture promotion institutions are in two parallel streams one is scientific & government institutions another is administrative department of agriculture management, which do not have concurrence at many front.

4.In this direction we have been using approach of creating local level farmers network, we are also moving towards traditional institution of "Gram Chopal" to take this agenda forward. In this direction we would like to collaborate with other agencies and groups who are active with this approach.

5.Improvement in farm diversity through tools like "What we produce - What we consume" and focusing on concept of reducing "Food Mileage" could be really helpful in this direction

Thanks

Deepak

## Dhananjaya Poudyal, Nepal Nutrition Foundation, Nepal

Q. What interventions do you think are needed to increase the agriculture sector resilience to environmental stressors, especially among smallholder farmers?

Low or middle income countries are highly suffering from various environmental hazards impacting to almost all the people of the country. But, especially the smallholder farmers known as small farmers who are living in a poor condition even in the form of tenants are vulnerable. They have to suffer from different environmental threats like untimely and torrential rain, drought, flood, landslides, avalanches, earthquake, and epidemics etc. They are lacking of food to meet their hunger every day. Consequently, the under 5 children and the lactating and pregnant mothers will highly be affected due to deficiencies of nutrients resulting to malnutrition. Further it will be more serious in the case of under two children who could be retarded physically as well as mentally. Thus the environmental hazards are suppressing to the countries towards low level of food and nutrition security.

Considering the scenario of agriculture sector resilience to environmental stress some remedies is recommended focusing to the small farmers as follows:

1. Orientation about the improved farming techniques depending upon the food crop that they are cultivating. Use of compost, as one of the techniques, especially the vermin compost is highly recommended for organic farming that is more lucrative and nutritious with high demand in the market.
2. Facilitation and orientation to promote production and consumption of indigenous foods depending upon the soil and climatic condition of the locality.
3. Provided the inputs like seeds, medicines, and other machineries for farming.
4. Prefer to intensive farming rather than extensive to get better productions from limited area of the land.
5. Prefer to use traditional tools / weapons in sloping area to save the land from sweeping way and landslides in sloping area.
6. Increase awareness of crop diversification with potentialities.
7. Apply the policy of early warning system of disasters and natural calamities to the farmers.
8. Prefer to other types of farming like livestock and birds raising, aquaculture, cash crops like cardamom, ginger and tea plantation.
9. Provision of rented in of barren land to the small land holders should they want to cultivate on it.
10. Introduce the livelihood programs for the farmers to reduce dependency from farming occupation.

## Muraleedhar Prasad, Farm Care Foundation, India

Sustainable farming system should have resource conserving technologies, address climate resilience and should be community supported. Climate change is perhaps the most serious environmental threat to the fight against hunger, malnutrition, disease and poverty, mainly through its impact on agricultural productivity.

Agriculture is a major provider of environmental services and it plays an important role in sequestering carbon, managing watersheds and preserving biodiversity. Agriculture is also a major consumer of natural resource, contributing to underground water depletion, agrochemical pollution, soil exhaustion and global climate change. Agricultural extension personnel have to take a lead role in this respect in promoting sustainable farming system.

Consumers are now more concerned about obtaining safe food.. Food safety involves a much broader range of public health issues related to food production. Food safety concerns begin from on farm production of food commodities. It is the key entry point for the introduction of management practices that allow minimising potential contamination with excessive residues of harmful chemicals in food and water. GAP is one such preventive food safety approach which ensures that food is produced concerning about health and environment. Nutrition and food security must be considered in developing food safety guidelines and standards.

The International Human Rights framework which includes instruments that address the right to food, water and health as well as human rights is to be considered. Food sovereignty is critical because our current food and farming system is thoroughly broken. Food sovereignty is essential to guarantee the human rights of communities to choose when and how their food is produced and what food they consume. This is more relevant in the present context of controversy related to type of food being consumed

Prof. R. M. Prasad

Former Professor, Kerala Agricultural University

## Sonali Phate, M S Swaminathan Research Foundation, Chennai, India

Dear Sir,

Greetings !

Please find [below an] article for discussion on subject Sustainable farming systems for food and nutritional security. Hope you will find it relevant and useful.

Thank you !

Best Regards,

Sonali Phate  
Kamalnayan Jamnalal Bajaj Foundation, Wardha  
Maharashtra, India

**Developing Climate Resilient Food Systems in Wardha District of Maharashtra**

Wardha district is one of the 35 districts in Maharashtra state in western India. This district is part of Nagpur division. Wardha is primarily an agriculture oriented district. Cotton farming and soyabean cultivation in kharif is quite common. Recently the district has been in news because of a number of suicides that have been committed by the farmers owing to the agricultural loans they cannot repay with the major reasons being bad crops, droughts and lack of irrigation facilities in the region.

Kamalnayan Jamnalal Bajaj Foundation (KJBF) in Wardha is doing many activities for rural people's betterment. These activities are aimed at protection of natural resources, agriculture, social progress and providing options of livelihood. These activities are executed through participatory process and the planning of the programs is decided as per the need of the people. In Wardha district the programme had expanded over 700 villages benefiting 1,04,160 families and strengthening the livelihood of 5,31,215 rural people.

Following is the case story of one of the small and marginal farmers who fruitfully put all his efforts for combating climate change and becoming self-reliant. His farm has been evoved as model of biodiversity of crops and friendly insects. He cultivates almost 30 different crops throughout the year ranging from cash crops, vegetables, fruits, flowers and spices.

**Defining Destiny through Multi cropping**

Uttam Ajabrao Salame is a farmer of village Ekburji of Arvi taluka of Wardha district. He was working as a labour in sugar mill at Jamni which was suddenly closed down due to internal issues; as a result, he became unemployed. His wife was working as a farm labour. The children were still getting educated and the financial condition of the house was not sound.

He owns 4 acres of land, out of which he could irrigate only 2 acres of area with water available in the open dug well. After losing the job, he began to cultivate his own farm. He was growing usual crops like soya bean, cotton and red gram. Initially, he was adopted practices of chemical farming for cultivation with which his net earnings used to be almost nil. In 2009, he was induced with the thought of establishing dry land horticulture and changing cropping pattern to improve over the productivity. Along with that, he was also convinced for adoption of practices of natural farming to reduce the cost of cultivation. He established *Wadi* in 2010-11 by planting 25 mango trees, 20 Amla trees and 8 lemon trees. He also planted 260 teak saplings and black cheery saplings along the borders of the farm. This plantation later worked as a live fence for protecting the interior plantation from the attack of wild animal. Tree saplings for the plantation material were provided by KJBF. He cultivated soya bean as an intercrop in *Wadi* during *Kharif* and vegetables during *Rabi* seasons. He adopted practices of zero budget natural farming for cultivation which resulted in reduction of input cost. His net earnings in the very first year with the sale of vegetables were Rs. 20,000. This recovered the input cost for cultivation over 4 acres and the income from soya bean, red gram and chick pea cultivation accounted as a net profit. He was very happy and satisfied with the adoption of natural farming practices and began to adopt it on all his four acres of land.

In the year 2011-12, he adopted multi-layered cropping pattern and established banana, papaya, drum sticks, medicinal plants and vegetable cultivation in the *Wadi*. With this, his net annual earnings reached to Rs.80,000 from all 4 acres of land area. He began to sell his produce by developing direct linkages with consumers, thus, ensuring premium prices for the produce. He formulated the demands among the consumers by creating in them awareness about health and nutritional benefits of naturally grown foods. Now, his production gets sold from the farm itself. With this, his net annual earnings have reached up to Rs. 1,00,000 per acre.

Uttamrao is a very innovative farmer and one finds him overwhelmed with confidence on account of the achievements of past two years. In the year 2012-13, he cultivated turmeric crop in *Wadi* plantation along with cultivation of variety of vegetables. The good quality turmeric saplings were provided by KJBF. He multiplied them and stored the produce for the next year use. He wisely manages the relay cropping throughout the year. In 2012-13, his net per acre profit was Rs. 1.5 lakh.

Under the guidance of representatives of KJBF, Uttamrao began to cultivate floricultural crop of Gaillardia inside the *Wadi* as a mixed crop intermingled with the plots of vegetables. By selling Gaillardia flowers in the market, he received a net income of Rs. 60,000. This had further boosted his confidence and in the year 2016-17, he started raising marigold, tuberose and Lilly flowers.

In the year 2015-16, 15 mango plants had a fruit bearing. He covered each of the fruits with the butter paper to protect them from attack of parrots. He had a harvest of 1000 kg mangoes which he sold at an average rate of Rs.100 /kg, thus, accruing him a total income of Rs. 1,50,000 and this will continue for the next 15 years. He expects 100 kg minimum production of *Amla* in the year 2017-18 along with the mangoes.

Uttamrao always keeps his soil covered with mulch and applies *Jeevamruta* regularly. This has improved the health of soil and organic matter content of soil has increased from 0.2 % to 1 %. Mixed and multi-layered cropping pattern is minimizing the weeding and this practice has set an example for the other farmers which show that farmers can create their own destiny with proper utilization of their available resources and inner desires for prosperity. Now, his son got married and finds future in farming. Uttamrao shares his success with his wife Sheela for her equal efforts and motivation. Besides sharing farming work, she also harvests and conserve the seeds for next year use. This has brought them seed sufficiency. They now feel no anxiety even if they need to sow the seeds for the second time due to failure of first sowing as a result of prolonged monsoon.

**Sonali Mahendra Phate (Zadgaonkar)**

Kamalnayan Jamnalal Bajaj Foundation

Gopuri, Sathoda Road, Opp. Chetana Vikas Farm,

Parvati Nagari, Wardha-442001(M.S.)

## Takele Teshome, Association for Sustainable Development Aternatives (ASDA), Ethiopia

Dear Moderator

As to me sustainable farming system requires proper land use planning and cropping patter as mono cropping practice is the major cause for production decline due to decreased soil fertility, It also develops resistance to pests and diseases which is the main factor for production decline and food and nutrition insecurity

Inadequate understanding of food security in its full content also aggravates food and nutrition insecurity. Heavy focus on food availability while ignoring access issues and utilization where the importance of nutrition comes in.

Sustainable farming system also requires research, extension and farmers linkages to identify underlying causes of food and nutrition insecurity in order to design remedial measures. Considering the hidden hunger such as zinc defficiency, the need for biofortification, nutrition education and demonstration of vegetable meal preparation using school garden, farmers field days are essential

Regards

Takele

## Aliza Pradhan, co-facilitator of the discussion

Thank you Nicole Lowe for sharing your research. Interesting!

## Aliza Pradhan, co-facilitator of the discussion

Thank you Takele Teshome for your contribution. Rightly said about importance of proper land use planning and cropping pattern as well as creating nutrition awareness and building linkages among different stakeholders towards achieving food and nutritional security. Regarding sustainability of nutrition awareness programs, I would like to share one example from our study. Besides having workshops and meetings, we are also conducting training programs to build capacity of local men and women (Known as "Community Hunger Fighters") on nutrition related messages such as balanced diet, importance of hygiene and sanitation, nutritive value of different foods, food requirement at different stages of life cycle as well as different ways of linking agriculture to nutrition, knowledge of entitlements on agriculture, food and nutrition in the area, so that they diffuse the message within and outside the community.

We also have nutrition garden interventions in schools and ICDS centres where different groups of vegetables are grown and the produce is going towards the Mid Day Meal.

Thanks.

Aliza

## Daramola Tolu, Nigeria

What interventions do you think are needed to increase the agriculture sector resilience to environmental stressors, especially among smallholder farmers?

Presently, in Nigeria it is easier for a well-established farm to get intervention that someone who has a land and a business plan with no heavy funds or assets in collateral

One of the major issues with West African countries is that intervention comes in form of cash which are often diverted of misappropriated.

A lot of awareness is need to make the small farmers see reason to change their ways and ensuring they get practical intervention is one of the many things needed.

Most small scale farmers cannot afford the cost of machineries nor the cost of entry into the elite cooperatives that get easy access to interventions so they continue to toil for their meagre yield. Government intervention is often tied to empowering specific individuals.

Let us assume that instead of giving an individual a tractor, the government gives a farming settlement and locals are able to lease at much reduced rates. This would encourage cooperation in choice of crops (planting, harvesting processing gets synchronized, and ensure the community as a whole is able to work with government policies and goals instead of individuals striving alone.

Insisting on been part of a cooperative has not been working well as the administrators have also sabotaged the process often monetizing benefits to members...hence my suggesting Farm allotted settlements be identified and related with like Local Government Areas thus breaking barriers for everyone within the settlement.

## Vethaiya Balasubramanian, India

Rice is the most staple food in Asia. The Asian rice sector supports 140 million farmers who cultivate rice on 145 million hectares of harvested area, employs 300 million people in the rice value chain activities, and it is an important staple food for 60% of the Asian population. The mean size of one hectare per farm is too small to support a family of 5-6 members. Further continuous fragmentation of rice farms after each generation poses serious challenges to the viability of rice farming in Asia. Given the mounting pressures to quit rice farming, smallholder farmers continue to persist, especially in South and East Asia, despite fast developing economy and increasing urbanization. There is also a growing agrarian crisis in most developing countries of Asia due to a long neglect of rural areas where most of the smallholders live and farm. They suffer from poverty, malnutrition, dispossession of land assets, and death. We need an urgent and a comprehensive solution to tackle this rural degradation and agrarian crisis.

Precision farming and resource-conserving technologies are now available and new ones are being developed to tackle the technical constraints of rice-based farming systems. Farmers must be empowered and facilitated to better adopt the currently available technologies -- the Best Management Practices for lowland rice farming in Asia.

Climate change remediation by individual farmers: Farmers must make every family farm a climate-smart farm, one which is equipped with the knowledge and technologies essential to manage and mitigate the expected adverse impacts of Climate Change on agriculture. Achieving the triple objectives – adaptation, mitigation and food security – is increasingly being called “climate-smart agriculture.” In climate smart farms, farmers should use stress (flood, drought, pests and diseases) tolerant or resistant rice varieties with appropriate production technologies that reduce such stresses. In addition, farmers need to improve cropland management practices and restore organic matter into the soil. Increasing soil organic matter content in farms not only increases carbon sequestration – a climate mitigation function, but also enhances soil quality, water-holding capacity, nutrient use efficiency, and finally higher crop yields. Alternative wetting and drying (AWD) irrigation method thus has the potential to reduce the global warming impact of irrigated rice farming by one-third, relative to the continuously flooded rice system.

Government actions needed to contain climate change: Important actions, ones which must be taken by national or local governments, include building irrigation-drainage facilities for farmers to cope with changing rainfall patterns. There must be an adequate supply of good quality seeds and other farm inputs at the right price. Governments should assist in the building of rural processing facilities and improve farmers’ access to key markets. Government support for affordable rural education and healthcare and renewable energy infrastructure is imperative.

Finally, favorable policy and institutional support are critical for:

Identifying climate-related risks and stresses along the entire value chain

Breeding rice varieties that are more tolerant of climate-related abiotic stress (drought, flood, cold, & high temperature) and also have increased resistance to biotic stressors (insect pests and diseases)

Deployment of scientific findings and technologies to make farming practices much more efficient at using natural resources of soil, water, and energy, while optimizing necessary external inputs, including fertilizers and pesticides

Equipping and empowering smallholder farmers to adopt ecologically sound conservation agriculture practices. These will include improving soil health and fertility, a better management of water and energy resources, enhancing biodiversity both on-farm and off-farm, implementing appropriate farm mechanization, and using agroforestry systems whenever feasible

Enhancing the adoption of smallholder crop-animal production systems as a means to improve cash flow, family nutrition and health, and resilience against abrupt changes in weather and or markets.

Addressing the socio-economic and policy constraints is the most difficult for all. Rural reconstruction is the key to improving rural livelihoods and reducing rural to urban migration. What we need is to develop smart villages rather than smart cities by improving rural living conditions through better and affordable healthcare and education facilities, better rural infrastructure for farm production, processing and storage, as well as good roads and efficient transport to well-functioning markets.

Given the persistence of smallholders in Asia, the governments should enable such farmers to make a decent living out of their farms. We need to explore some smart ways to increase the effective farm size through consolidation of small holdings without farmers losing their title to their lands. Some examples of increasing effective farm size include a kind of “village farming” in China, “small farmers, large farm” in Vietnam, and professionally managed groups of small holders in Indonesia. Farmers in such large virtual farms should have decent access to good quality water resources, favorable land tenure system, favorable weather, appropriate technologies, training and technical support, credit, insurance, and adequate rural infrastructure (health, education, roads, transport, and processing and storage facilities). Such well-supported large virtual farms will adopt precision farming methods to produce adequate quantities of good quality produce for efficient marketing at attractive price.

Over all, we need appropriate policy and institutional support systems in place – ones which will allow farmers to make intensification of rice farming sustainable, profitable, regenerative, and supportive of the land and water resource bases, and of the environment. A comprehensive understanding of scientific, technical, environmental, economical, and societal issues - including re-education of farmers and stabilization of the human population – is a prerequisite to effectively implementing eco-efficient farming practices. There is, however, no assurance that all the necessary prerequisites will be met, yet the food and nutrition security of billions of human beings depends on success in implementing a truly sustainable agricultural ecosystem(s) for growing rice across Asia.

## Nitya Rao, School of International Development and LANSA, India

Within the gender research conducted through LANSA in India, we have examined the impact of agriculture and the environment on food and nutrition security. In Koraput, Odisha, we found that women control the choice of crops and the output, critical for household nutrition, in the uplands. They grow millets, horsegram, niger and vegetables on these plots(Rao, 2017 <http://lansasouthasia.org/content/gendered-time-seasonality-and-nutrition-insights-two-indian-districts>). These contribute to the diversity of diets at home, but women also sell small quantities in the local markets, whenever they need cash for expenses.

Yet today corporate interventions, especially the rapid spread of eucalyptus plantations for the paper industry, across this region, is displacing women farmers from their upland plots. A Paroja woman in Koraput noted, “I used to grow mandya in two plots for our daily consumption. Someone from the company spoke to my husband and convinced him of the profitability of planting eucalyptus. He agreed, and now I have only one plot left. Only if there is food from our land, is there happiness”. The option of course is to purchase millets from the market, but this is hardly available and prices are unaffordable.

While denying the jointness of both production and reproduction in tribal areas, these interventions are gradually making male control of land, income and indeed women the norm, with negative consequences for nutrition. Baseline nutritional data from LANSA research in Koraput indicates that over 50% of both under-5 and adult population are underweight, especially amongst the STs and SCs. The National Nutrition Monitoring Bureau (2009), noting a marginal decline in Chronic Energy Deficiency amongst STs between 1985-2008, alongside a secular decline in the consumption of roots and tubers, as well as other vegetables, confirms this finding.

## Aminata Fatmata Kandeh, Agro Fish farm, Sierra Leone

Dear All

I am Aminata F Kandeh from Sierra Leone thanks to these who have contributed to the different topic in this forum. Am so delighted to be part of this forum am learning a lot , I will like to give my own contribution on question four which says What interventions do you think are needed to increase the agriculture sector resilience to environmental stressors, especially among smallholder farmers? In my country we have not yet embark on commercial farming although we have some people in to it but the percentage is not compared to those that are not. Am sure the major problem is with the government they should provide the enable environment for us such as good road network, electricity and many more. Also the agricultural sector should provide the necessary input and equipment for the farmers, for example machines, Seeds and other farm input at very reasonable price so that the farmers will be able to plant and on time.

I will want the government to pay more attention to agriculture because it is the way out for the development of my country we are blessed with so many raw materials, minerals and the climate condition is ok. In addition they need to encourage investors in the field to invest in the country by reducing the level of taxes on them and also make sure that they sign an agreement that whatever raw materials they produce in the country should be as well processed here.

Furthermore, most of the students that studied agriculture do not want to go to the field because we are not encouraged as those that studied accounting, information Technology and the likes. Majority of the youth in my country see farming as poor man job and most of them are living in the city, the stakeholders need to make the field very attractive one like the others and also provide basic facilities such as pipe burn water, electricity, health centers and the likes in all the districts by so doing we will have more youth going in to farming. This is my humble contribution thanks for reading.

## Rajendran Tp, Visitng Fellow, Research & Information System Fo Developing Countries, India

India has been traditionally practicing integrated farming system (IFS) in households. With the small piece of land of 0.4 ha or below that food commodities for the family used to be through cereal crops, tuber crops and vegetables along with backyard poultry and goats if not one or two bovine animals.

The idea of commercial agriculture led to mono-cropping and market driven agriculture. Emphasis on quantities paved the road for the use of agrochemicals such as fertilizers, pesticides and other agrochemicals. The package of practices towards maximization of yield from high yielding crop varieties (hybrids??) left with farmers the paradigm of hopeful bounty although every five year average was ‘standstill progress’ of the farm economics. High investment for maximization of farm productivity focused to crops left the farmers with negative balance and huge risk in the wake of dwindling marketing opportunity.

UN-Sustainable development goal-2 aspires for zero hunger and sustainable agriculture. Sustainability cannot be dreamt of in agriculture with drive for targeted agricultural production and productivity through technologies that suck in farmers’ investment for farm inputs. It has ended up as market driven hawkish input service system and no market appreciation for farm commodities.

Today globally farmers have become disillusioned due to the unsustainable farm economics. Indian farmers’ plight is no different from this. The challenge on nutrition of farm families due to negative balance arising from farming lead to poor nutrition of these small-farmers (land holders & landless laborers) and farm-families.

Sustainable agriculture shall focus into nutritious farm commodities and is possible if the marginal farmers are given direct cash transfer for purchase of commodities from market wherever these are not cultivated or produced in their farms.

Lastly addiction to tobacco and alcohol has become rampant in rural life. Tobacco is used in families to suppress hunger of its members who ultimately become addicts. The government policies on these revenue earning commodities has become evil influence in rural life. The aspiration for sustainable agriculture and nutritional security backfires when the health of the rural farming communities is challenged under the influence of government patronage of such addictive substances.

The correction of such situation begins from a moral and pecuniary upgradation of rural folks.

Can non-government organizations arise and group together to fight this impasse?

## Alan Dangour, co-facilitator of the discussion

Today marks the opening of the 23rd Conference of the Parties in Bonn, Germany (so called COP23) which is the United Nations’ annual meeting on climate change. A major theme of the conference this year will be the roll that the agriculture sector has in meeting globally-agreed greenhouse gas emission targets. It is therefore really exciting to see such an active forum discussion board, read your thoughts and learn about all the interesting research underway.

Over the past week I have been particularly struck by contributions that have identified the importance of agriculture as a provider of eco-system services that support efforts to reduce the environmental impacts of farming. But many contributors have also noted the sometimes negative impacts of agricultural policies that don’t directly consider environmental impacts on issues such as land use, women’s empowerment and nutrition outcomes.

Several contributors have provided interesting lists of actions in agriculture (both technologies and interventions/policies) that are thought to benefit environmental outcomes. But how strong is the evidence for these technologies and policies? Do we really have the data to press policy makers to be making the right decisions that benefit both the planet and populations? Finally, our discussions have largely been about small-scale farming activities. While small-holder and subsistence farmers are among the most vulnerable populations on earth, does their impact on the environment outweigh the role of big agri-business? Should we in fact be focusing much more on the role that big business has to play in this critical issue?

We’ve only got a few days left on this forum so please send in your thoughts quickly! Thanks to you all for your superb contributions so far.

## Barnali Chakraborty, Research and Evaluation Division of BRAC and LANSA, Bangladesh

Recently we have conducted a study in the north-eastern part of Bangladesh known as haor region where people live more than 6 months with flood in a year. The study participants indicated that the main occupation of the people in haor is rice cultivation and they have been doing it from generation to generation. They need to depend on their rice production to maintain their livelihood. However, they can hardly do it throughout the year because of long term flood. During the period of flood, they stop agricultural work and migrate to other places to find out alternatives otherwise stay jobless. Sometimes, the flood ravage their paddy fields before harvesting. The whole thing affect their living standard, food consumption, and nutritional status. Now, if we talk about sustainable farming systems for nutrition for such areas like haor we really need to understand how much it is possible to increase the resilience of farming systems in those areas given the seasonal vulnerability and remoteness of the areas. It will not be surprising if people grown up in such a vulnerable condition, consider nutritional diversity as a luxury because of their limited scope of growing diversified crops, and everyday struggle to secure shelter, earning and other basic needs.

## Priya Rampal, MS Swaminathan Research Foundation, India

In the current discussion, the focus has been chiefly on the impact of agriculture on nutrition security. In this context, I wanted to bring in the role of the government in promoting food and nutrition security amongst the population. In India, the Public Distribution System (PDS) is an important channel through which the vulnerable sections receive a monthly quota of cereals, kerosene and sugar. A few states have initiated the distribution of pulses and millets in the PDS. It is no surprise that these particular states such as Andhra Pradesh, Tamil Nadu, Telangana and Chhattisgarh- for pulses and Karnataka- for millets also show a better nutrition status.

In the agriculture sector, a few schemes such as Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM) in 2004 gave states the flexibility to utilize the funds for the scheme/crop of their choice. In 2007, the Additional Central Assistance Scheme (RKVY) incentivised states to draw up plans for their agriculture sector more comprehensively, taking agro-climatic conditions, natural resource issues and technology into account, and integrating livestock, poultry and fisheries more fully. These are just a few examples to showcase that the role of the government is extremely important in the promotion of a farming system which aids nutrition security.

## Durlave Roy, Northern Agro Services Ltd, Bangladesh

Sustainable use of natural resources

New approaches to fertilization: Achieving sustainable agriculture

To feed the growing population of the world it is essential to increase the agricultural production radically, we do not have unlimited sources and one planet so we must think in long term period.

That means we must be responsible for the economic, the environmental and social requirements of the sustainable agriculture as well.

To achieve the target, we have to improve the efficiency of the fertilizers and fertilizer practices by continuous research and developments and innovation.

We must take into focus the balanced and targeted fertilization to improve the efficiency .we have to improve the organic activity of the soil to boost the root and the efficiency of the nutrient uptake the crop.

## Milly Monkhei, Botswana University of Agriculture and Natural resources (BUAN), Botswana

I will focus my contribution on question three "Have you had any experiences of linking research and policy regarding sustainable agricultural systems for nutrition?" sharing the Botswana experience, a middle income country. Research on technology adoption by small holder farmers in Botswana has revealed that small holder farmers did not adopt raw planting, a technology meant to increase yield per hectare of food staples (sorghum, maize and legumes).In the drive to improve small holder productivity government implemented a raw planting policy that  got small holders to take up the technology as they were not to be given seed if they did not raw plant. This policy has seen small holder farmers raw planting and mono-cropping against the nutrition provision of their broadcasting method which ensured that many crops of different nutritive value were planted in one hectare. This is an example of conflicting efforts through policy dispensation. With broad casting small holder farmers were assured sustainable nutrition from a variety of crops that provided nutrition diversity, but with raw planting and mono-cropping the technology compromised nutrition diversity at house hold level for small holder farmers.

This says to us, it is very important to widely and in deathly consider the implication and consequences of policies on different target groups before they are implemented, especially that in a heterogeneous population a one size fit all policy will never address nor achieve the intended end without appreciating and considering heterogeneity of the target population.

## Mahesh Maske, Borlaug Institute for South Asia (BISA, India

Thanks to be part of this wonderful forum, I will like to give my own contribution to question four stated What interventions do you think are needed to increase the agriculture sector resilience to environmental stressors, especially among smallholder farmers?

Climate change is a significant and growing threat to Food and Nutrition security affecting vulnerable populations in many countries. Farmers in many agricultural regions, especially in rainfed belts already appear to have experienced to declines in farm production because of climate change. Climate change affects food production, availability, prices, impacting overall calorie consumption as well as consumption of healthy foods, such as vegetables, fruits, and animal-source foods.

There is increasing interest in leveraging the climate smart interventions to mitigate risks. These includes a range of practices and technologies suitable for local sustainable agricultural system and community’s need. These include water smart practices (rainwater harvesting, laser land levelling, micro-irrigation, raised bed planting, change in crop establishment methods), weather smart activities (ICT-based agro-advisories, index-based insurance, stress tolerant crop varieties), nutrient smart practices (site specific nutrient management, precision fertilizers, residue management, legume catch-cropping), carbon and energy smart practices (agroforestry, conservation tillage, residue management, legumes, livestock management) and knowledge smart activities (crop diversification, farmer-farmer learning, capacity enhancement on climate-smart agriculture, community seed banks and cooperatives, market information and off-farm risk management).

They have considerable potential for increasing agricultural production for food and nutrition security, helping farmers adapt to a changing climate, and providing mitigation benefits. These interventions need to be focused to sustainable farming systems for Food and Nutrition Security.

## Aklilu Nigussie, Ethiopian Institutes of Agricultural Research, Ethiopia

1. Yes; we are working on farming system in Ethiopia with sub dividing it with different crop and livestock farming system. For instance at present we are analyzing some part of the data like Teff and wheat farming system with thousands of sample households. This data set has environmental histories and climate variability impact on the household. Furthermore; new varieties compatibility and changes within the last 25 years in the farming system.

4. Here the intervention may vary according to the degree of impact and other variables. Yet; this could help generalizing the concept;-

* Develop a planning tools on forecasting the variability trend
* Integrate climatic information to the farming community level or village hubs
* Develop agricultural modules or technics of manuals for climate adaptation with indigenous knowledge and scientific means
* Integrated research and community based knowledge for low moisture technologies in variety and breed
* integrating crop and livestock diversification; and so many other techniques

## Florence Egal, Food Security and Nutrition expert, Italy

Being retired, I am not in the best position to respond to the first two questions but have been very interested in the different contributions. For whatever it is worth, let me raise a few points.

References have been made throughout to sustainable farming systems. I would suggest a twin-track perspective:

* at household/community level, farming systems should be seen in the context of sustainable livelihoods, which should also include off-farm income - in particular food processing, marketing and catering – and migration/remittances.
* at territorial level, we should be looking at sustainable food systems and again farming systems would only be a key element.

Revisiting the existing supply-driven system can only have a limited impact and value chains are only one dimension of food systems. It is urgent to adopt a demand-driven perspective.

When talking of resilience to environmental stressors, we should review systematically indigenous food (farming) systems, which are usually low-input and risk-adverse. « Modern » agriculture techniques have undermined resilience and introduced/increased environmental stresses. These should be identified and removed, and legislation/regulations reviewed accordingly.

It is urgent that scientific research reviews promising local practices via inter-disciplinary teams - including lawyers - and participatory processes with a view to generate practice-based evidence to inform policy. The ten principles identified by IPES-food - <http://www.ipes-food.org/images/CoreDocs/IPES-Food_10_principles.pdf> would provide a good basis.

## Mohammad Abdul Mazid, IFPRI/HarvestPlus Washington, Bangladesh

Thanks so much for the comments, suggestion and recommendation. Climate change, food and nutrition security for the marginal, small holders are very important. Small holders lacks quality seeds of nutrients rich Biofortified crops, inadequate knowledge, poor extension services, marketing links. Moreover needs attention on post-harvest processing of Biofortified crops especially high zinc rice(HZnR), iron rich lentil (IRL), provitamin A rich orange flesh sweet potato (OFSP), nutrients retention, cooking methods, intake amounts, frequency of intake, dietary diversity of under 5 childs, adolescents girls, pregnant women, preschool and primary students. So production of Biofortified rice based cropping patterns in land types (HL, ML),Post harvest processing, Consumption, Marketing links are vital for improving food and nutrition security of marginal, small holders in rural peoples in Bangladesh and others Asian and African countries.

Take care and best wishes.

Dr. Mazid

## Bhavani R Vaidyanathan, M S Swaminathan Research Foundation, India

On question 3, linking evidence from research to bring about desired change in policy is a challenge, but what is most needed for impact at scale. This calls for a process of continuous engagement with policy makers at multiple levels, keeping them informed, producing briefs that convey the evidence from research in simple, understandable terms sans technical jargon, targeting specific policies where feasible, clarity on costs and time required where possible, keeping an eye on every available opportunity to reach out and inform, and active use of social media.

The process is more impactful when the practitioners themselves become the spokespersons for what is being recommended. For instance, under the Farming System for Nutrition Study of LANSA, farm men and women in India are now sharing their experiences of imbibing and practising a farming system approach for bettering nutrition outcomes (e.g. see <http://lansasouthasia.org/content/%E2%80%9Ci-wish-teach-others-line-sowing-practices%E2%80%9D>; <http://lansasouthasia.org/search/node/Block%20level> ;).

To move to the next level of uptake, the FSN approach requires policy support for nutrient-dense crops in terms of input access, prices, and development of the value chain. The evidence provided by numbers, backed by voices of the practitioners, the stories of change are all elements that add up to provide thrust to the effort.

Bhavani  
India

## Anita Pinheiro, Research and Information Systems for Developing Countries, India

The dominant notion of agri-food system emphasis on the calorie requirement and the quantity of grains required to feed the growing population and hence demand for techno-managerial solutions for further intensification of production and incremental innovations. These incremental changes in the existing agri-food regime are in favor of large-scale farming systems and hardly address the concerns of smallholder farmers and resilience of marginal and small-scale food production systems. Moreover, the dominant agri-food regime has failed to ensure increased food and nutrition security with respect to the increase in food production. In this context, what we require are system level changes that acknowledge the multifunctionality of agriculture and de-linking agriculture from the notion of large-scale intensive production.

Decentralization of safe-to-eat food production is inevitable to address the increasing vulnerabilities elicited by the conventional mode of food production. Food production has to be concentrated in marginal and small-holders farms and it has to be further extended from farms to food and nutrition gardens in backyards, rooftops, and all other available spaces. Urban food production also needs to be adopted to ensure the resilience of urban systems and to minimise the export of wastes outside the urban setting. The ongoing interventions to ensure self-reliance on the production of safe-to-eat vegetables in Kerala (India) would be of importance in this context.

To address the vulnerabilities experienced due to dependent food economy and conventional agriculture, Kerala is in the making of a transition towards self-reliant and sustainable agri-food systems, especially in the case of vegetables. Adoption of food system localization and agroecological practices have become an agenda of the government and R&D. In order to facilitate this, the Vegetable Development Program (started in 2012) of the state government of Kerala explores every possible space for safe-to-eat food production that includes schools, government institutions, backyards and on rooftops of both rural and urban areas. The rural-urban continuum, high population density, and space constraints made it inevitable to consider food production in the urban setting as well. This is mainly carried out through the promotion of home-based nutrition gardens and also by providing portable composting units and/or biogas units to recycle the biodegradable kitchen wastes so as to use for vegetable gardening. Both the government and social actors play key roles to develop new technologies and practices for vegetable cultivation. New and improved technologies and methods of vegetable cultivation in the backyards and rooftops of rural and urban premises have received a place in the government policy as well as in the R &D agenda of Kerala. The main emphasis of both the actors is to develop solutions to overcome the spatial constraints of Kerala and to adopt agroecological methods of cultivation. The government subsidy schemes facilitate diffusion of grow-bags (with vegetable saplings) and protected cultivation technologies (polyhouse/greenhouse and rain shelter) amongst the rural and urban residents, along with drip-irrigation units for water conservation.

The bottom-up actions from the social actors take a complementary approach. Social media, particularly facebook (FB), has become a platform for the enactment of these activities. Interested people started different groups on facebook which aimed to promote different aspects of food system localization and agroecology including grassroots innovations. These groups are operated in Malayalam, the vernacular language of Kerala and the group member comprises of Keralites living in different parts of the globe. The objectives of these groups includes promotion of kitchen gardening, promotion of commercial farming adopting organic and agroecological practices, marketing of organically grown produce etc. Some of the activities prominent in these Facebook groups include sharing of seeds of local and traditional crops, conducting annual kitchen garden competitions, providing platform for sales of home-grown surplus produce, annual meets to further strengthening their activities etc. Apart from adopting some of these technologies (and also while rejecting some), they develop their own methods and technologies which are shared to each other through these facebook groups and thereby reinforce the government intervention by filling the gaps.

The ongoing transitions in the agri-food system of Kerala are entrusted upon extending food production from farms to gardens and replacing hazardous chemicals with locally available or locally developed measures. In this way, food production is becoming a routine of many of the households, schools, and government and private institutions. This does not only enhance the resilience of the entire locality to withstand the externalities of a dependent food economy but also helps to strengthen the local level production for local level consumption.

More details can be found at <https://steps-centre.org/blog/kerala-making-transition-towards-healthy-home-grown-food/>

## Alan Dangour, Aliza Pradhan, Md. Sirajul Islam, co-facilitators of the discussion

On behalf of the LANSA research consortium, may I thank you all enormously for contributing to a hugely interesting debate on the critical issue of sustainable farming systems for food and nutrition security. Contributions have been wide-ranging in both content and geographic focus and have demonstrated the impressive commitments and resolve of practitioners and researchers in this field.

As the COP23 meetings enter their second week in Bonn, it is clear that agriculture is becoming a critical focus area for policy makers. At this time more than ever, high quality research evidence is needed to support policy makers to make decisions about how to sustain national and global agricultural systems in an uncertain future.

The quality of the debate on this forum has encouraged me greatly that there is much excellent work underway. But the challenge is big and there is much still to do.

Thank you again.

Alan Dangour, Aliza Pradhan, Md. Sirajul Islam

## Lily Dora Núñez de la Torre Caller, Asociacion de Mujeres Indigenas Tawantinsuyo, Peru

**FACTORES MÁS IMPACTANTES DEL MEDIO AMBIENTE EN LA AGRICULTURA Y SEGURIDAD ALIMENTARIA NUTRICIONAL EN PERÚ**

**1.- MINERÍA CONTAMINA AGUAS Y SUBSUELOS**

Cualquier método de extracción del oro aluvial se basa en el movimiento de tierras, desplazando gran cantidad de suelo, y gravas por la acción del agua utilizada para el “lavado” del material aurífero. Este proceso trae como resultado el incremento de los sólidos en suspensión en el agua, lo cual afecta la vida acuática. En síntesis podemos decir que los impactos ambientales son:

•Alteración de morfología.

•Erosión de áreas explotadas.

•Deforestación.

•Descarga de sedimentos.

•Colmatación del cauce de ríos

•Deterioro de la calidad del agua.

•Contaminación por mercurio

•Desaparición de flora y fauna acuática y alejamiento de la fauna terrestre.(6)

Ejemplos de éste problema son: La reciente Emergencia Sanitaria decretada por el Ministerio de Salud, la cual se extenderá a 5466 personas de las cuales 4893 son menores de 12 años y 573 gestantes frente a los reclamos de los pobladores del distrito de Simón Bolívar en la ciudad de Cerro de Pasco donde: . “Más de 1.000 niños padecen hoy enfermedades por la contaminación de su sangre con polimetal, con una presencia mayor de los metales plomo y mercurio”, según detalló ayer su representante Fidel Minaya.

Cerro de Pasco es la capital de la región andina de Pasco, situada a más de 4.300 metros sobre el nivel del mar en el centro de Perú y construida cerca de una mina a tajo abierto, donde hoy opera la peruana Compañía Minera Volcán. Los manifestantes piden que, como parte de la política de salud, se cree una clínica de desintoxicación de plomo y otros metales, un laboratorio toxicológico y que se analice y diagnostique a todos los niños, jóvenes y adultos de Cerro de Pasco (8)

Otro caso muy preocupante es la vinculación que existiría entre la contaminación de la cuenca del lago Titicaca con el 76% de anemia en niños de 6-36 meses de edad en la Región Puno (ENDES 2016) , uno de los centros mineros más importantes del Perú.

Según lo señala el Diario: “Correo” el 01.10.2017:

**“PUNO: PREPARAN DECLARATORIA DE EMERGENCIA POR ALTO ÍNDICE DE ANEMIA INFANTIL”**

**Director de la DIRESA ( Dirección Regional de Salud) señala que hay motivo suficiente para la declaratoria, pues al menos siete de cada 10 menores tienen la enfermedad.**

**En el artículo publicado por la autora ( ver ref.9)**

“ PESE A LAS INTERVENCIONES CON LAS FAMOSAS “ CHISPITAS” EXISTEN OTROS FACTORES MUCHO MÁS COMPLICADOS Y DE LARGA DATA QUE ESTARÍAN INFLUENCIANDO PARA QUE ÉSTE PROBLEMA DE LA REGIÓN PUNO NO SE REVIERTA **Y TIENEN DIRECTA VINCULACIÓN CON LA CONTAMINACIÓN DE LA CUENCA DEL LAGO TITICACA**. PARA EJEMPLO SE PUEDEN CONSIDERAR IMPORTANTES INVESTIGACIONES QUE LO DEMUESTRAN…”

El ciclo de vida ofrece un sólido marco de trabajo para discutir los desafíos de la nutrición durante las diversas fases del ciclo de vida en las que se presentan factores de riesgo para la salud. Los tres primeros años de vida son los más importantes. se requiere implementar prácticas adecuadas de alimentación para los niños, como por ejemplo la lactancia materna exclusiva durante los seis primeros meses y una adecuada alimentación complementaria durante los próximos treinta meses, prácticas aunadas a la ingesta de micronutrientes y a la implementación de cuidados de salud infantil para prevenir enfermedades diarreicas y respiratorias. Estos factores, en el mediano y largo plazo, influirán en el rendimiento cognitivo, la productividad laboral y la resistencia a las enfermedades y, en la etapa adulta, en el menor riesgo de problemas de obesidad, trastornos cardíacos, elevada presión arterial y otros problemas crónicos asociados a la alimentación. De este modo, las intervenciones nutricionales y de salud que previenen la desnutrición crónica infantil cobran vital relevancia para el adecuado desarrollo nutricional de los seres humanos a lo largo de su vida.(3)

**DIFUSIÓN EN MEDIOS DE COMUNICACIÓN ES REPRIMIDA**

21|10|2017.– Mediante una repudiable actitud por parte de la Policía Nacional del Perú, fueron detenidos de manera arbitraria siete periodistas, en circunstancias que retornaban desde la provincia de Caylloma región Arequipa, luego de concluir un reportaje sobre la contaminación ambiental que realiza la minera Buenaventura.

Fue el propio oficial PNP Capitán Bustamante Marroqui, quien los maltrato y amenazó de muerte a los periodistas, incluso rastrillando su armamento para luego ordenar al personal policial a su cargo que cumpliera con la detención. Además de haber sido golpeados y maltratados, los policías les habrían arrebatado sus cámaras, según denunciaron al llegar a Arequipa.

Entre los detenidos se encuentran Julio Revilla Riega, Martín Ramos Mamani, Walter Porras Laguna, Carlos Zuñiga Zeballos, Jesús Fernández Rivera y Gian Carlos Aragón.

Los hombres de prensa habrían recogido imágenes e información de los relaves mineros en la cabecera de cuenca del río Colca. Al volver, encontraron el camino bloqueado por montículos de tierra. Enseguida, unos 15 efectivos policiales los intervinieron y los trasladaron bajo detención por los supuestos de usurpación y minería ilegal. (10)

**El Estado alienta la minería**

El Estado aún no tiene acciones en marcha ni una política definida, fuera de algunos enunciados fragmentados y sectoriales, para enfrentar esta situación. Sin embargo, impulsa las inversiones mineras, las mismas que necesitan del recurso agua para todas sus operaciones, de manera cuantiosa, lo cual sólo puede empeorar la situación, porque es un uso concurrente al del uso agrícola y urbano, y que, por otro lado, aumentará los costos de su depuración y/o potabilización especialmente en el Perú (2)

“ En inversión en infraestructura y minería: se ha priorizado una nueva cartera de 23 proyectos para acelerar la ejecución de la inversión privada por más de US $ 27,3 mil millones, lo que incluye 11 proyectos de inversión minera por más de US$ 18 mil millones.(7)

**2.- LA DEFORESTACIÓN GENERA MÁS CAMBIO CLIMÁTICO.**

“El Perú genera muy poco de estos gases de efecto invernadero y se estima que su contribución total es poco menos del medio por ciento (0.4%) del total que se emite globalmente.  De las emisiones generadas en el territorio nacional, las representadas por la deforestación y cambio de uso de las tierras de nuestros bosques primarios, representa más del 50%. Los bosques primarios actúan como sumideros de CO2 de gases de efecto invernadero y retiran básicamente el CO2 de la atmosfera, fijándolo como carbono en los arboles del bosque. Sin embargo, la paradoja consiste en que a pesar de ser un pequeñísimo contribuyente al cambio climático, el Perú, su población, y especialmente la población rural de menores ingresos relativos (que dependen casi totalmente del clima para todas sus actividades productivas y de supervivencia), estarán entre los más perjudicados del planeta por el impacto del cambio climático.

Otro efecto del cambio climático, que es un efecto global, es que fenómenos climáticos recurrentes también de carácter global como el Fenómeno del Niño, los huracanes y tifones se producirán de manera más frecuente y con mayor intensidad a nivel mundial “ .(2)

La alteración y con frecuencia destrucción total de la vegetación de las orillas de los ríos por el dragado, y con el uso del mercurio para la amalgamación del oro, vienen alterando los suelos; como consecuencia es difícil que vuelva a crecer algún tipo de vegetación. Cincuenta mil hectáreas de bosques han sido devastadas por la minería ilegal solo en la cuenca del río Madre de Dios.” (6)

**3.- AGRICULTURA AMENAZADA POR ENVEJECIMIENTO Y MIGRACIÓN POR DESASTRES NATURALES**

El concepto de “Nueva Ruralidad” parte de una redefinición de lo rural, invitando a que se reconsidere la visión tradicional, que dice que rural es población dispersa centrada en el sector agropecuario, para pasar a la reconstrucción del objeto de trabajo y de política sobre la base de definir el ámbito rural como el territorio construido a partir del uso y apropiación de recursos naturales, donde se generan procesos productivos, culturales, sociales y políticos nacidos del efecto de localización y apropiación territorial que se desprende de que los recursos naturales son factores de producción localizados. El Perú es altamente vulnerable a los riesgos ocasionados por fenómenos naturales o efectos del cambio climático, como son inundaciones, heladas, huaicos, sequías, friajes, entre otros. Cualquier evento catastrófico afecta la producción de alimentos y empobrece a las familias por la pérdida de sus bienes. La presencia de plagas y enfermedades nuevas y recurrentes pone en riesgo el suministro y la inocuidad de alimentos vulnerando la seguridad alimentaria y nutricional. Tal es el caso de la gripe aviar, el cólera porcino, la encefalopatía espongiforme bovina (EEB) o enfermedad de la “vaca loca”, entre otras. Asimismo, nuestro país está también expuesto a la volatilidad de precios de los alimentos. Esto se acentúa más en épocas de crisis económicas mundiales que pueden reducir la capacidad para el suministro y acceso a los alimentos. La gestión del riesgo está orientada a la implementación de acciones de prevención y mitigación para reducir la repercusión de los potenciales impactos. (3)

**Cambios Demográficos en la Población Rural**

Dentro de las variables consideradas dentro de esta tendencia creciente están el incremento del envejecimiento de la población rural y el incremento del costo de mano de obra del agricultor. Factores como la falta de servicios básicos de buena calidad, como: caminos, telecomunicaciones, agua y saneamiento, energía eléctrica, educación, salud y sobretodo la baja remuneración, generan una migración a las zonas urbanas, ocasionando un decrecimiento de la población rural. Adicionalmente la población rural busca diversificar sus ingresos, siendo los percibidos por agricultura menos representativos del ingreso familiar dándose una migración en busca de mejorar los niveles de ingreso. Todo ello genera un desarrollo territorial, donde prima la expansión urbana. (1)

**4.- EXPORTACIÓN Y PRODUCCIÓN ORGÁNICA ELEVA COSTOS DE ALIMENTOS EN CONSUMO INTERNO.**

“Las condiciones favorables para el desarrollo de esta tendencia se dan por el incremento de socios comerciales. El sector agroexportador ha mostrado un gran dinamismo resultante de cuatro factores: Nuevos productos; nuevas regiones productoras; ampliación de mercados gracias a los acuerdos de libre comercio; y ligera tendencia a un mayor valor agregado. Es así que entre el 2002 y el 2012 las exportaciones agropecuarias pasan de 766 millones de dólares a 4,100 millones de dólares, aunque en el 2011 se había alcanzado el nivel más alto de 4,500 millones de dólares. Además, en dicho período el número de productos con exportaciones mayores de 15 millones de dólares pasa de 5 a 25, evidenciando una importante diversificación de la cartera de agro-exportaciones.

Es importante citar los tratados de Libre Comercio firmados con: Estados Unidos, China, Canadá, Corea, Chile, Tailandia, Japón y la Unión Europea.” (1)

A la fecha Perú tiene más de 50 Acuerdos Comerciales con diferentes países, pero si bien es cierto que ésta actividad favorece positivamente a la balanza comercial, en el consumo interno el desabastecimiento y alza de los productos están repercutiendo con fuerza en la población de escasos recursos y en su seguridad alimentaria nutricional.

Una prueba de ésta afirmación son los indicadores que registra el INEI sobre:

**a) POBREZA**

En el Perú 264 mil personas dejaron de ser pobres entre los años 2015 y 2016 según informó el Jefe del Instituto Nacional de Estadística e Informática (INEI), Dr. Aníbal Sánchez Aguilar. (10/05/2017) Durante el evento de presentación de las Cifras de la Pobreza Monetaria en el Perú 2016, indicó que en los últimos cinco años (2012-2016), 1 millón 773 mil personas dejaron de ser pobres al disminuir en 7,1 puntos porcentuales y en los últimos 10 años (2007-2016) se redujo en 28,4 puntos porcentuales, lo cual significó que 7 millones 304 mil personas dejaron de ser pobres.

La incidencia de la pobreza en el área rural alcanzó al 43,8% de la población reduciéndose en 1,4 puntos porcentuales respecto al año 2015; mientras que en el área urbana afectó al 13,9% de la población al disminuir en 0,6 puntos porcentuales en comparación con el año anterior. (4)

**B) ANEMIA Y DESNUTRICIÓN CRÓNICA 2016**

Los resultados de la Encuesta Demográfica y de Salud Familiar (Endes) 2016 a cargo del [**Instituto Nacional de Estadística e Informática (INEI)**](http://larepublica.pe/tag/inei), revelan que el 43,6% de la población comprendida entre los 6 meses y 3 años presenta este problema de salud.

Si el análisis se enfoca solo en la [**zona urbana**](http://cdn8.larepublica.pe/sociedad/855527-tumbes-desborde-de-rios-tumbes-y-zarumilla-inunda-zona-urbana-de-la-region) del país, la cifra se reduce a 39,9%; sin embargo, es en **el área rural** donde el problema se agudiza y alcanza **el 53,4%.**

**En los últimos cinco años, la anemia ha aumentado 2%, al pasar de 41,6% en el 2011, a 43,6% en el 2016.**

Los departamentos de [**Puno**](http://larepublica.pe/tag/puno), **Loreto, Pasco, Huancavelica y Ucayali**son los que más incidencias presentan.

La [**desnutrición**](http://larepublica.pe/impresa/sociedad/821301-la-batalla-contra-la-desnutricion-y-anemia-no-termina-en-cusco) crónica es otro indicador que, si bien ha registrado cierta reducción, se mantiene amenazante.

En el estudio, el 13,1% de los niños menores de 5 años tiene **desnutrición crónica**. Esto equivalía a 400 mil niños y niñas aproximadamente, cifra que ha logrado una reducción de 1,3% respecto al 2015.

*"El área rural sigue siendo la más afectada en cuanto a desnutrición crónica con 26,5%, mientras que en la zona urbana el porcentaje es de 7.9%*", explicó **Aníbal Sánchez Aguilar**, jefe del [**INEI**](http://larepublica.pe/tag/inei). (5)

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**10.-** **DIARIO PERU (21.10.2017)** NOTICIA*:” Perú: 07 Periodistas fueron detenidos por denunciar contaminación de minera buenaventura.”* Consultado en: http://www.diarioperu.com.pe/peru-07-periodistas-fueron-detenidos-por-denunciar-contaminacion-de-minera-buenaventura/