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Title of paper: **Ecological Toilet Emerging as a Solution to Food Security in Nepal**

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Abstract

In Nepal, it is estimated that approximately 3.4 million Nepalese require food assistance and a staggering 6.4 million are chronically food insecure. In the past, there were culture of using human waste and animal waste as a fertilizer in the field. Most of the communities in the hills and mountains still use human faeces to fertilize their farms. The Newar communities in the capital city are well known for their practice of using human waste in their farms. However, because of the influence of the rapid modernization, many households are forgetting their good practices and adopting unsustainable options of sanitation and using chemical fertilizers. Looking at this, the Government of Nepal started to promote Ecological Sanitation (EcoSan) toilet not only as an option of toilet but also as a solution to food security, livelihood and climate change. Nepal is vulnerable in terms of the impact of the climate change. EcoSan is both mitigation and adaptation option to climate change. Many communities are already experiencing many adverse effects due to the climate change. Water sources have dried up due to unfavourable climate and the food production is declining gradually. The EcoSan is therefore proven to be the better option as an adaptation to climate change. Mr. Jeevan Maharjan, a farmer in *Siddipur*, used human faeces and urine, grew cauliflower, cabbage, leaf vegetables, potatoes and garlic and attracted so many seekers of organic vegetable products from city areas in the *Kathmandu* valley. Besides, some women in his locality also started selling such organic vegetables which in turn contributed to uplift their economic condition. Some farmers at *Khokana* in *Lalitpur* district wisely and widely applied urine for growing vegetables and wheat. In the same manner, some locally motivated farmers at *Sunawal* in *Nawalparasi* district started collecting and applying urine in mass scale in collaborative manner. The messages on such success motivated the toilet users in *Sabaithawa*, *Surkhet*, *Gorkha*, *Dang* and other districts also to apply urine for vegetables and crops. The collection and application of urine in mass level got wider popularity by a noble initiative of Mr. Shreendra Pokhrel, a committed activist of ecological toilet and resident of *Darechowk* village in *Chitwan* district. With his restless efforts, *Darechowk* is emerging as a learning zone and demonstration site for ecological sanitation where one can find urine-based farming among local households. And there is an exchange of urine among local residents to fulfil the need of organic fertilizer. It is likely that the scaling up of these locally held micro-level initiatives thus appear as an effective means to popularize organic products, generate additional income, increase the nutrient intake, maximize the surplus of food grain from the marginal land and ultimately contribute to food security at local ecology especially in the context of worsening soil and climatic conditions aggravated by the climate change.

Keywords: Organic product, marginal, ecology and food security.

1. Traditional Practices of EcoSan Approach in Nepal

Human faeces are used to feed animals in some of the communities in the hill and mountain regions in Nepal. For generations, the farmers of *Kathmandu* valley have been using faeces in their farms. The communities in middle hill apply grey water in kitchen garden. Very often, rural communities mix and dispose cattle dung, urine, grasses, dry leaves and bio-degradable kitchen wastes in a ditch to produce manure for crops. Biogas is used to produce methane for cooking or lighting at household levels. Decentralized waste water treatment system is adopted to treat small volumes of wastewater. These all practices have prepared a firm basis for promoting Ecological Sanitation (EcoSan) approach in Nepal. The provision of urination for women children and old ones in a pit, locally called "*Nauga*", within their house below staircase at ground floor, which is a traditional sanitary practice (DNet, 2003, p.5). EcoSan encompasses knowledge and tools, which are used by the communities to manipulate their environment for adaptation and survival (Bhattarai, et.al, 2006, p.29). This paper has been prepared on the basis published source of information, interaction with EcoSan toilet users and experts and some field observations. This paper highlights on application of EcoSan approach as well as utility, challenges and opportunities in Nepal.

2. EcoSan Toilet as a Part of Local Ecology and Economy

EcoSan toilet has ecological and economic significance. Local people have wisely conceived the flow of energy from human to plant as "*Pet Dekhi Khetma and Khet Dekhi Petma*" (from stomach to farm and from farm to stomach). EcoSan toilet is known as "*Mal Charpi*" (organic manure producing toilet) and "*Dhan Charpi*" (wealth producing toilet). Importantly, the local saying "*Jaane Mohar, Najana Fohar*" (If you know resource, if you don't know waste) shows that people were fully aware about the economic values inherent in the waste. The farmers in the *Bhaktapur* district are famous for producing healthy and delicious cauliflowers and leaf vegetables that are more demanded by customers and expensive in the local market. Also, it is believed that all the EcoSan products contain more nutrient than others.

An estimate shows that the equivalent value of the fertilizer produced by a family of an average size in a year is estimated at about NRs 2, 000. The cost of a latrine will be recovered within four years. The equivalent financial value of the nutrients of the urine and faeces is about NRs 7.11 billion which is equivalent to 50% of the total fertilizers being imported every year (Mishra and Shrestha, 2006, p.2). This data has become instrumental to show the economic benefit of EcoSan toilet and reduce the excessive use of chemical fertilizers nurtured long with the process of modernization. In sum, EcoSan approach has contributed to retain the productive capacity of the soil and maintain the cycle of energy flow between people and plant and perpetuate the harmony of culture with nature. The use of faeces fostered the productive capacity of soil, rejuvenated soil condition and enriched farm ecosystem (Adhikari, 2006, p.50). EcoSan approach has contributed to maximize agricultural outputs from the marginal lands. These examples show that there are both micro-economic and macro-economic implications of EcoSan toilet in the country's context.

3. Emergence and Scaling up of EcoSan Toilet

The Department of Water Supply and Sewerage (DWSS) and WHO piloted the urine diverting EcoSan toilets at *Siddhipur* in *Lalitpur* district in 2002. Some Non Governmental Organizations (NGOs) also piloted it gradually. Dry and wet types of EcoSan toilets have been introduced in Nepal. In dry EcoSan, faeces is separated from urine and collected in a vault chamber. And in wet EcoSan, offset twin pits with water seal and urine-separating pan is used. The existing policy frameworks are favourable to promote EcoSan toilets in the country. Traditionally, EcoSan toilets were adopted mainly among faeco-friendly agricultural communities in the *Kathmandu* valley but these days it has been scaled up in other

mountain, hill and *Terai* (plain land) communities. Gradually, the concept 'EcoSan Village' (village having all EcoSan toilets), 'EcoSan Resource Centre' (place for learning EcoSan) and 'Organic Farming' (use of faeces and urine in vegetables and crops) are becoming popular.

EcoSan Resource Centre established in *Darechowk* village in *Chitwan* district has drawn the adequate attention of policy makers, planners, politician and people. And it has widely advocated the need of EcoSan toilet. Collection and application of urine is being popular there. Besides, EcoSan toilets are installed in schools and bus stands in *Tanahun* district and *Nawalparasi* district respectively (Aryal et.al, 2015, p.13). These days, collection, transportation and application of urine have become a common phenomenon in some communities. In addition, application of urine is popular at *Khokana* in *Lalitpur* district, at *Sunawal* in *Nawalparasi* district and some communities in *Surkhet* and *Gorkha* districts. Communities have experienced that the use of excreta as manure has increased agricultural yields, improved soil condition, enriched taste of products and made the vegetables look good (Paudel and Adhikari, 2012, p. 98). A survey conducted shows that a total of 2,095 EcoSan toilets have been installed in 19 districts in different ecological regions showing potential for scaling up in diverse socio-cultural setting and geography (Aryal et.al, 2015, p.14).

4. A Few Cases of Application of Human Faeces and Urine and Livelihood Promotion

Case-I (Sabaithawa, Parsa District): During monitoring visit at Sabaithawa in 2005, a local farmer had shared interesting experiment of urine application in a bean plant. He said he regularly applied urine in a bean plant as manure as well as insecticide and claimed that its production is healthier and fairly higher than ordinary beans. "I can save money invested to purchase insecticide if this experiment becomes successful", he added.

Case-II (Khokna, Lalitpur): A household owner has stored urine in the plastic tanks. One of the eco-san promoters of the locality said that local users credit the urine as petrol (source of energy). He added urine is applied in a mass scale in vegetable and wheat crop. And the practice of *Aincho Paincho* (give and take) of urine is a common among the eco-san users at *Khokana*. For this reason, the problem pertaining to scarcity of urine is resolved locally. This locally held practice has made EcoSan users self-reliant for agricultural production.

Case-III (Siddipur, Lalitpur): Mr. Jeevan Maharjan, a farmer in Siddipur, is applying EcoSan approach. He is famous for using human faeces and urine. He said that he has mixed human and cow urine to increase agricultural productivity. He has grown cauliflower, cabbage, leaf vegetables, potatoes and garlic applying this organic manure. It is important to note that he could attract so many buyers of organic vegetable products from city areas in the *Kathmandu* valley.

Case-IV (Siddipur, Lalitpur): A women farmer from a community in *Siddipur* confidently lime lighted the benefit from EcoSan thus: "in the earlier days I used to sell the vegetable products with a difficulty as the product in my locality was massive with a limited market access. Since the time I started to use human faeces together with cow dung and urine, the productivity and the quality of vegetable increased significantly. The products in my farm land got massive popularity in and around the locality. As a result, the local buyers wait me in the morning to purchase my products even if I become late to carry the vegetable up to them in the set time. Now, I am delighted having the beneficial EcoSan approach and receiving this opportunity to sell my vegetables as a high valued product. I have a confidence that I can earn money from eco-san and make the subsistence of my family more comfortable in future".

Case-V (Shantinagar, Kathmandu): Mr. Nawal Kishor Mishra, the pioneer of EcoSan toilet promotion in Nepal, has been applying urine in his roof top farming. He regularly collects his urine in a plastic pot and applies the concentrated urine in vegetables and trees such as guava and lemon. He

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produces cauliflower, garlic and some species of leaf vegetables. These agricultural productions are fairly attractive and he says that these vegetable products are of better taste and quality.

Case-VI (Dholahity, Lalitpur): Mr. Madan Rai, is a devotee and live library of EcoSan approach in Nepal. He is continuously and effectively soliciting the practical experiences on application of faeces and urine based on the research works held with different plants and vegetables in his own farm land. He has been using dry EcoSan toilets in his households, applying urine, decomposed faeces and grey water in the farm and strongly advocating the need of EcoSan as a sustainable and inevitable approach for better subsistence. He mixes the dry faeces, degradable kitchen wastes and excreta of chicken and disposes them under a shed for its perfect decomposition before using in the farm. During discussion, he confidently said that there will be very insignificant impact of climate change and significant impact in poverty reduction provided EcoSan approach is adopted at household, community and country level.

Case-VII (Sunawal, Nawalparasi): A local entrepreneur, Mr. Nar Bahadur Khadka, worked as an icon of EcoSan toilet promotion in his locality. He promoted dry EcoSan toilet in his households. He successfully used urine and decomposed faeces in the farm and also persuaded his neighbours for mass collection and application of urine in their village especially for vegetables. Because of his effort, collection and application of urine got popularity in the locality. Besides, an EcoSan toilet was installed across the highway area nearby his village.

Case-VIII (Darechowk, Chitwan): Mr. Shreendra Pokhrel, an activist of EcoSan toilet and resident of *Darechowk* village has widely applied urine in his vegetable farming and effectively persuaded his neighbours too. An EcoSan resource centre has been introduced with his leadership. He started to promote urine collection across the highway through a popular slogan titled "*take a pee and get one rupee*". THE SEWA Nepal (a local NGO at *Darechowk*) is involved for promotional actions. The concept of village tourism has been introduced there as a part of EcoSan promotion (Adhikari, 2012, p.119). Besides, he has led an innovation to collect urine in mass scale on the occasion of big political gathering, fare and festivals. For example, on the occasion of the first WASH Expo 2015 organized by the DWSS and Water Supply, Sanitation and Hygiene (WASH) sector stakeholders, he collected the urine of the participants. The Expo was attended by some 1500 key persons of the WASH sector in Nepal. This initiative contributed for strong advocacy for urine application.

5. Opportunities, Challenges and Way forward

Both policy framework and local culture are supportive to promote EcoSan toilet in Nepal. The people applying urine and faeces as a manure are fully convinced to accept EcoSan approach as a basis of sanitation and livelihood. In Nepal, it is estimated that approximately 3.4 million Nepalese require food assistance and a staggering 6.4 million are chronically food insecure. So, the role of EcoSan toilet seems imperative for assisting their food intake particularly in the context of worsening soil productivity aggravated by the adverse effect of climate change. However, very limited resource has been mobilized for EcoSan toilet promotion in Nepal from both the Government and support agencies.

The concept of EcoSan toilet was introduced with a great excitement but its expansion is rather slow in comparison with other conventional toilets. Inappropriate technical knowhow about urine application and leakage and breakage in pipes, pans and urine storage system are some of the de-motivating factors. It has been found that urine of women is not collected on the occasion of mass gathering due to lack of women friendly urine collection technology. Similarly, the promoters of dry EcoSan toilets are habituated in collecting, drying and applying the decomposed faeces in farm. But, it has been found that the faeces collected in wet EcoSan toilets is very rarely used as a manure even though urine collected from this toilet is applied in the field in most cases. Most of the EcoSan toilet owners use their urine and decomposed faeces in their own farms. But the case of *Sunwal* is exceptional. There, all the households provide the urine to the local urine collector. The urine thus collected is used by each household on

rotation basis. Nevertheless, story of the mass collection of urine is different. Mr. Shreendra Pokhrel, the pioneer of mass urine collection on the special event, builds a temporary structure for urine collection only and transports it to the locally demanded places. He has not collected women's urine so far. For triggering the potential users, EcoSan toilet should be promoted as a sustainable means for waste management and livelihood promotion. Besides, collection and utilization of urine from household, schools, business houses and public toilets needs further attention for increasing economic interest and scaling up at scale. Likewise, involvement of private entrepreneurs is instrumental for financing, marketing and scaling up. Collaboration with research institutions other development sector actors should be promoted for increasing financing opportunities and undertaking research and development works on themes like socio-cultural, livelihood, proper handling, appropriate technology, health impact, economic aspects of EcoSan as well as food security in the context of increasing impact of climate change and disasters.

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Autobiography of Mr. Kamal Adhikari and Mr. Bipin Poudel

Born in 1967 A.D and holding Masters Degree in Anthropology and Bachelor's Degree in Law and Mathematics, Mr. Kamal Adhikari, is one of the founder promoters of ecological toilets in Nepal. He has been contributing to policy formulation, research works, knowledge management and capacity development. He has obtained training on ecological sanitation from Sewden in 2009. He is a co-author of guidelines on ecological toilet produced by the Department of Water Supply and Sewerage (DWSS). He has been working as sociologist with the DWSS. He is the author of the book titled Sanitation in Nepal: Past, Present and Future 2012.

Mr. Bipin Poudel, with a masters on environmental science, is a young researcher and practitioner in the field of environment, sanitation and EcoSan in Nepal. He has been working, since March 2008, in the field of environment, sanitation and Ecosan. He had coordinated the national level research on EcoSan conducted in 2009 and also has co-authored EcoSan promotion guideline published by the Government of Nepal and presented papers in National and International Conferences.