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MULTIPLE DYNAMICS OF GLOBAL CHALLENGES FOR OUR FUTURE AGRICULTURAL PRACTICES

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ABSTRACT

The great North-South divide between the developed industrialized western nations and the developing and under developed economically backward nations with respect to adopting appropriate mitigation measures to deal with challenges of Climate Change has significant impact on global agriculture. The lack of cooperation, coordination, collaboration and communication (4Cs) between First and Third World countries on various aspects of Climate Change issues is only sliding down our strategies to cope with Global Warming and related global geoatmospheric changes negatively impacting both our ecology and economy. Without close cooperation there is very little chance that we would be able to deal with Climate Changes at a global scale impacting the future of our global agriculture. Furthermore, we are losing our natural biological pollinators at an astonishing rate. Loss of honey bees and native (wild) bees along with other pollinator insects, snails and slugs, birds and small mammals like bats have significant negative impacts on our ecology and economy. Around 85% of flowering plants are dependent on biological pollinators like bees to propagate. Several anthropogenic factors such as over application of toxic chemical pesticides, pollution, prevalence of various parasitic diseases and Colony Collapse Disorders (CCD, poor immunity, lack of suitable melliferous flora and changes in land use patterns are collectively resulting in catastrophic bee and other insect population collapse around the globe. Loss of pollinators means destruction of our agriculture, apiculture and forestry industries leading to economic disruption and ecological stabilization. Sustainable, environment-friendly approaches like establishing Pollinator Sanctuaries has been proving to be effective five in bee conservation and local biodiversity enrichment with promising future for global agriculture.

Keywords: Agriculture, ecology, economy, Climate Change, Global Warming, pollinators, bees.

INTRODUCTION

The great North-South divide between the developed industrialized western nations and the developing and under developed economically backward nations with respect to adopting appropriate mitigation measures to deal with challenges of Climate Change has significant impact on global agriculture. The lack of cooperation, coordination, collaboration and communication (4Cs) between First and Third World countries on various aspects of Climate Change issues is only sliding down our strategies to cope with Global Warming and related global geo-atmospheric changes negatively impacting both our ecology and economy. Without close cooperation there is very little chance that we would be able to deal with Climate Changes at a global scale impacting the future of our global agriculture (Alvarez-Mor *et al*., 2016; Zandi and Basu, 2017).

Drastic global challenges and paradigm shift with negative impacts

The most significant obstacle towards mitigation of Climate Change abs Global Warming impacting our environment, ecosystem, economy, quality of life and future prospects is due to geopolitical differences between First and Third World Nations (Zandi and Basu, 2017. The developed nations do not wish to make any significant sacrifice for working towards global Climate Change mitigation by helping developed and under developing countries in shifting from conventional fossil fuel towards alternative energy usage as it costs huge investment money as well as the fear of losing the patents for these new technologies developed over a long period (Mo *et al*., 2017). Bu, it will take poor developing nations around 50-60 years to develop these technologies for implementation and the cost is super high (Zandi and Basu, 2017). It is

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impossible for many poor countries to reduce or slow down their industrial and agricultural expansions since they have fairly large standing human population that needs both food and work to survive. Any major socio-economic changes to this situation will result in political destabilization in these countries (Basu and Cetzal-Ix, 2018a,b). The current rich western democracies that has thrived by looting resources of the developing world through ruthless exploitation during the Colonial Period is now advising g others to make sacrifices for mitigating Climate Change (González-Valdivia *et al*., 2016).

Unfortunately, these western democracies are reluctant to make any shift in their agri-industrial infrastructure and development and also resisting any changes to their life style! Thus both sides are at a locking point with no one ready to share an inch of ground to the other. The consequences been we have been simply fixing dates for mitigation and has been historically failing to reach the emission standards in that stipulated time. The consequences have been devastating for global agriculture including food security issues along with low production, crop failures, unexpected flooding, draughts abs famines hitting bus relentlessly. The COVID-19 pandemic further deteriorated the digital pan globe and we are struggling to get out of this desperately. But truly speaking very little workable solution is currently available. This is a monumental challenge for the future of our global agriculture (Poot-Pool et al., 2018).

Decline of natural pollinators

Another important issue related to the challenges to our agriculture has been the fact that we are losing our natural biological pollinators like bees at an astonishing rate. Loss of honey bees and native (wild) bees along with other pollinator insects, snails and slugs, birds and small mammals like bats have significant negative impacts on our ecology and economy. Around 85% of flowering plants are dependent on biological pollinators like bees to propagate. Several anthropogenic factors such as over application of toxic chemical pesticides, pollution, prevalence of various parasitic diseases and Colony Collapse Disorders (CCD, poor immunity, lack of suitable melliferous flora and changes in land use patterns are collectively resulting in catastrophic bee and other insect population collapse around the globe. Loss of pollinators means complete destruction of our agriculture, apiculture and forestry industries leading to serious economic disruption and ecological destabilization. Sustainable, environment-friendly approaches like establishing Pollinator Sanctuaries has been proving to be effective in bee conservation and local biodiversity enrichment with promising future for global agriculture (Basu and Cetzal-Ix, 2018, a,b).

Establishing Pollinator Sanctuaries

The process that I have been working on is simply called Pollinator Sanctuary establishments by using mixture of various annual, biennial and perennial forage crops, ornamentals, local wild flowers, medicinal plants. The mixture contains 15-25 species of flowering plants with overlapping floral regimes to extend the bee foraging period. Furthermore, due to various root lengths of the species there is reduced competition among the plants since they derive nutrients and water from various depths of soil. This approach not only has been helping soil health by preventing soil erosion and maintaining soil nutrients and moisture but attracting wide diversity of pollinator insects including honey bees and native bees in large numbers. Over the time the sanctuaries get established and being a low cost-low maintenance it has been successfully adopted by farmers (Basu and Cetzal-Ix, 2017; Basu, 2019).

We are recommending the use of pollinator sanctuaries along any natural or artificial water bodies, farm perimeters, non-agronomic lands, hard to access areas of the farms, weed infested areas, city parks and gardens, lawns, backyard kitchen gardens, roof top gardens, forest fringes, social forestry areas and any open spaces in rural or urban areas. We have successfully implemented this in USA, Canada and Mexico (Martínez-Puc *et al*., 2018). Our initiatives are now being tried out in several Sub-Saharan African countries and some Latin American nations too. In Asia we have attempted this successfully at local levels in Nepal, Bhutan, India, Pakistan, Bangladesh, Thailand, Singapore, Indonesia, Malaysia, and some parts of Middle East and Central Asia and in some EU countries (Coh-Martinez et al., 2019).

To our astonishment we found that our low cost pollinator sanctuaries and pollinator gardens are not only attracting pollinator insects because of use of melliferous flora; but also small passerine birds feeding on various insects and seeds of plants. Raptors hunting small passerine birds and small amphibians (frogs and toads), reptiles (mostly lizards and small snakes), and mammals like voles, field rats, ground squirrels to mention a handful. Deer are regular visitor to our plants. In case of pollinator sanctuaries integrated with water body conservation we found fish socked ponds attracting large number of resident and migratory birds, making brief stops at our pollinator sanctuaries Thus we achieved multi-layer species conservation enriching local biodiversity, improve soil quality and help in conservation of soil health as well as conservation, protection and multiplication of our essential pollinator insects like bees to secure the long term future of our agriculture, apiculture and forestry (Basu, 2019).

I always encourage people who are supporting towards biological pollinator conservation to adopt multiple

strategies for attracting maximum number of species available to provide the umbrella of conservation upon them. Honeybees are not my big concern as these colonies can be regenerated by buying from commercial honeybee colony producers and adding to your existing colonies. But the native bees, moths and butterflies need serious protection. You can establish pollinator gardens with mixed species of various flowering plants with water drinking stations. You can also add bee bricks to your garden too for many species to nest. You can also include bee hotels or bee nests provided by some of the bee conservation foundations that are made of wood or bamboo to allow some species to nest. All these effort together can help in achieving our target (Basu and Cetzal-Ix, 2018, a,b). If you find any unused areas in your locality you can broadcast bee mix seeds in them for these plants to grow and help pollinators. Every bit counts and above all it builds up education and awareness (Basu, 2019).

Food for Thought

It is so nice to see kids participating in environmental awareness programs. Being our future citizens they are our precious torch bearers for a better planet to live and breathe. Earth Day is celebrated every year on April 22nd to raise education and awareness about global environmental issues among citizens of different nations. It is a one major global event that helps in sensitizing public regarding the environmental challenges we are currently facing, the mitigation process ad teaches us to behave as responsible citizens. We often take our natural resources as granted and do not pay serious attention to their judicial use. As a consequence destruction of global forests due to habitat encroachment, infrastructural developments, illegal migration into forested areas, explosive growth of local human populations and high dependence on forest resources (both major and minor products) has become quite common, with little or no concern from the political parties, governments, administrations as well as the ordinary citizens. Earth Day therefore makes us aware that we all need to act on a common platform to safe our green planet removing our differences. We need to move forward and work together to save our planet. We need to learn from the little children that we have to be more responsible and sensitive towards our nature. Only through our determination and dedication towards our society, ecosystem and environment could we think about working on bigger platforms to save our agriculture.

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