



## Sarus crane, agriculture and biodiversity

Sanjay C Masih<sup>1</sup>, Yogesh Chandra Patel<sup>2</sup>

<sup>1</sup> Department of Zoology, Ewing Christian College Prayagraj, Uttar Pradesh, India

<sup>2</sup> Department of Horticulture, Govt. Degree College Jakhini, Varanasi, Uttar Pradesh, India

### Abstract

Indian sarus crane, *Grus antigone antigone* is a monogamous, non-migratory and world's tallest flying bird. This is the only resident breeding crane of Indian sub-continent, prefers open habitat like marsh areas, abundantly irrigated paddy fields, grass land and wetland. Agriculture is the art, science and occupation of cultivating the soil, growing crops, aquaculture and raising livestock. It not only includes the preparation of plant and animal products for people to use for their survival but also distribution of these products to markets. It provides most of the world's food and fabrics. Biodiversity or biological diversity refers to the variety of life on Earth, comprising millions of plants, animals, microorganisms and the genes they contain. It simply means the existence of a wide variety of plant and animal species in their natural environments or the diversity of plant and animal life in a particular habitat. In present article, author tried to explain a positive correlation among the sarus crane, agriculture and biodiversity.

**Keywords:** sarus crane, biodiversity, wetland, sustainable farming, conservation

### Introduction

The Indian Sarus Crane, *Grus antigone antigone* is the largest of the crane species found in India (Sundar and Chaudhary, 2003)<sup>[3]</sup>. and prefers to inhabit close to human association. Besides the sarus crane, house sparrow and common myna are also associated with human habitation (Balwan and Saba, 2020)<sup>[1]</sup>. The sarus crane is inseparably associated with wetland habitats while house sparrow and common myna are seen both in urban and rural settings.

The sarus crane is now listed as globally threatened *i.e.* vulnerable bird species (IUCN Red List, 2020 and Bird Life International, 2020)<sup>[10]</sup>, as its population is decreasing. However, Verma and Prakash (2018)<sup>[22]</sup>, and Prakash and Verma (2019)<sup>[8]</sup>, reported an increase in its population in Kaushambi district of Uttar Pradesh. The sarus crane pairs are well known for their faithfulness and living togetherness and popular as eternal symbol of unconditional love, devotion and good fortune with high degree of marital fidelity as they pair for lifelong (Prakash and Verma, 2016<sup>[7]</sup>; Verma 2016a<sup>[11]</sup>, 2018a<sup>[16]</sup>; Verma and Prakash, 2017)<sup>[6]</sup>. The sarus crane is now 'State Bird of Uttar Pradesh' and shows strong positive correlation with agriculture (Verma, 2018b)<sup>[17]</sup>.

Agriculture always has both positive and negative effects on environment and social issues. Unsustainable agriculture has many negative effects that cannot be continued over long period of time. The agriculture should be practiced at sustainable level (Verma, 2017a<sup>[13]</sup>, 2018c)<sup>[18]</sup>. There are varied definitions of the term 'biodiversity'. According to Gaston and Spicer (2004)<sup>[5]</sup>, it is 'variation of life at all levels of biological organization'. It is usually described at three levels *namely* genetic, species and ecosystem and all these three work together to create the unique path for life on the earth (Verma, 2016b, 2017b)<sup>[12, 14]</sup>. The system of abiotic and biotic components together constitutes an

ecosystem. In order to maintain this system with widespread biodiversity, an ecological balance is needed (Verma, 2017c)<sup>[15]</sup>.

### Interrelationship between agriculture and biodiversity

Agriculture is one of the largest sectors to biodiversity loss with expanding impacts due to changing consumption patterns and growing populations. Agriculture destroys biodiversity by converting natural habitats to intensely managed systems and by releasing waste materials and pollutants (Kumar and Verma, 2017)<sup>[6]</sup>. Food value chains further amplify impacts including energy use, transport and waste. Reducing the food system's toll on biodiversity is a critical challenge (Dudley and Alexander, 2017)<sup>[3]</sup>.

Biodiversity is not only relevant for agricultural areas, but also necessary for the survival of entire biota including humans (Verma, 2018d)<sup>[19]</sup>. Agriculture can contribute to an increase and conservation of biodiversity. It has different functions of which production of food, feed and fibres and sustaining socio-economic structures and management of ecosystem services are the most important. In doing so, agriculture often makes use of and contributes to the services provided by ecosystems such as healthy soils. In a resilient agricultural system, farming practices provide a good balance between the exploitation and use of biodiversity, ecosystem services and the natural surroundings. In these systems, the challenge is to optimize food production while at the same time minimizing impacts on the environment and the ecosystem. Both agriculture and nature can benefit from a holistic approach towards resilient systems (Erisman *et al.*, 2016)<sup>[4]</sup>.

However, today's agriculture generally aims to produce large quantities of food, against the lowest economic costs, in the short term. These short-term goals often lead to conflict with the

Conservation and management of biodiversity and other long-term ecosystem services. India is a developing and agriculture dominated country. Its population is increasing day by day and in order to meet its nutritional requirement, the rate of agricultural production is continued to increase.

Agriculture, whether conventional or organic, always has some degree of impacts on the environment. Impact of agriculture on environment and biodiversity is both positive and negative. Unsustainable agriculture exerts mostly negative impact on the environment and biodiversity, which is often discussed merely in terms of pollution and imbalance of nutrients. However, negative impacts from unsustainable farming practices include several aspects *namely* land conversion, habitat loss, wasteful water consumption, soil erosion, genetic erosion, degradation as well as pollution.

Unsustainable development occurs when present progress is at the expense of future generations. Irresponsible planning and environmental degradation through exploitation of resources, generation of wastes and pollutants are the some reasons. Such practices are not sustainable in the long term. The true sustainable development is the optimum use of natural resources with high degree of reusability, minimum wastage, least generation of toxic by-products and maximum productivity. The sustainable development has multi-dimensional concept incorporating the interactions among society, economy and environment.

### Conclusion

Unsustainable means not able to be maintained or supported at current rate in future without upsetting the ecological balance by depleting natural resources while agriculture is the art, science and occupation of cultivating the soil, growing crops, aquaculture and raising livestock. The unsustainable agriculture is a form of agriculture that cannot be continued over long period of time. At the same time, agriculture has been shown to produce significant effects on climate change, primarily through the production and release of greenhouse gases etc. Unsustainability of agriculture is specific to every situation because 'sustainability' is the situation of being able to be continued over time- depends upon the combined results of the methods, species climate and soil properties for a particular specific agricultural situation. The true sustainable development is the optimum use of natural resources with high degree of reusability, minimum wastage, least generation of toxic by-products and maximum productivity. The sustainable development has multi-dimensional concept incorporating the interactions among society, economy and environment.

The global population is still increasing day by day which needs adequate food supply and nutritional requirement. This demand and requirement should be fulfilled by sustainable agriculture without causing any negative effects on environment. The unsustainable agriculture no doubt has multiple negative effects that must be minimized by promoting agricultural research and innovations. The rich and varied diversity of animals, plants and microbial life must have to be maintained for the purpose of ecological balance, which is indispensable for mutual survival and existence of living beings with a large of innovations in agriculture sector in order to achieve the goal of good security with sustainability. Thus, we have to maintain strong agriculture sector for food security but not at the cost of biodiversity.

We have to establish a good balance between agriculture and biodiversity because both are necessary for the existence and survival of the nature and all living creatures.

In fact, this is the major challenge of today to secure and increase agricultural yield while at the same time conserving biodiversity, ecosystems and resources as well. A paradigm shift is therefore required in agriculture to stop the large-scale loss of biodiversity in the agricultural landscape and soil. Author proposes a holistic approach that contributes to the development and implementation of sustainable agricultural practices. An agricultural system based on the full potential of biodiversity provides opportunities to create a resilient system in which both food production and nature can thrive that in turn can bring a system of sustainable development. In order to achieve the sustainable development, each and every one should obey the effective environmental ethics, minimize the harmful anthropogenic activities, promote inclusive education and development and care for earth, environment and biodiversity (Verma, 2019)<sup>[8]</sup>. Everyone should understand the multiple dimensions of sustainability and attempt to develop measures, criteria and principles for them (Yadav, 2016). All stakeholders should explore the patterns and levels of natural resource available and their optimum use with ecological and social sustainability.

### References

- Balwan WK, Saba N. Decline of House Sparrow and Common Myna Population in Doda Region of Jammu and Kashmir, India. *International Journal of Biological Innovations*. 2020; 2(1):20-24.
- Bird Life International. IUCN Red List for birds, 2020. Downloaded from <http://www.birdlife.org>
- Dudley N, Alexander S. Agriculture and biodiversity: A Review. *Biodiversity*. 2017; 18(2-3):45-49.
- Erisman JW, van Eekeren N, de Wit J, Koopmans C, Cuijpers W, Oerlemans N, *et al.* Agriculture and biodiversity: A better balance benefits both. *AIMS Agriculture and Food*. 2016; 1(2):157-174.
- Gaston KJ, Spicer JI. *Biodiversity: An Introduction*. 2nd ed. Wiley Blackwell Publishing, 2004, 208.
- Kumar Ajay, Verma AK. Biodiversity loss and its Ecological impact in India. *International Journal on Biological Sciences*. 2017; 8(2):156-160.
- Prakash S, Verma AK. Marital fidelity and congregation of Indian sarus crane, *Grus antigone antigone* in and around Alwara lake of district Kaushambi (Uttar Pradesh), India. *International Journal of Biological Research*. 2016; 4(1):10-13.
- Prakash S, Verma AK. Comparative Analysis of Sarus Crane Population from 2012-2019 in and around Alwara Lake of District Kaushambi (U.P.), India. *International Journal of Biological Innovations*. 2019; 1(2):36-39.
- Sundar KSG, Choudhary BC. The Indian Sarus Crane *Grus a. antigone*: a literature review. *J. Ecol. Soc. (India)*. 2003; 16:16-41.
- IUCN. The IUCN Red List of Threatened Species, 2020. Version 2020-2. <https://www.iucnredlist.org>.
- Verma AK. The Sarus Crane Pair: Made for Each Other. *International Journal on Biological Sciences*. 2016a; 7(2):87-89.

12. Verma AK. Biodiversity: Its Different Levels and Values. *International Journal on Environmental Sciences*. 2016b; 7(2):143-145.
13. Verma AK. Multiple effects of Unsustainable Agriculture. *International Journal on Agricultural Sciences*. 2017a; 8(1):24-26.
14. Verma AK. Genetic Diversity as Buffer in Biodiversity. *Indian Journal of Biology*. 2017b; 4(1):61-63.
15. Verma AK. Necessity of Ecological Balance for Widespread Biodiversity. *Indian Journal of Biology*. 2017c; 4(2):158-160.
16. Verma AK. Sarus Crane Pair: An Epitome of Unconditional Love, Devotion and Good Fortune with high Degree of Marital Fidelity. *International Journal on Environmental Sciences*. 2018a; 9(2):123-126.
17. Verma AK. Positive correlation between Indian Sarus Crane and Agriculture. *Journal of Experimental Zoology, India*. 2018b; 21(2):801-803.
18. Verma AK. Unsustainable Agriculture, Environmental Ethics and Ecological Balance. *HortFlora Research Spectrum*. 2018c; 7(3):239-241.
19. Verma AK. Ecological Balance: An Indispensable Need for Human Survival. *Journal of Experimental Zoology, India*. 2018d; 21(1):407-409.
20. Verma AK. Sustainable Development and Environmental Ethics. *International Journal on Environmental Sciences*. 2019; 10(1):1-5.
21. Verma AK, Prakash S. Sarus Crane: An Eternal Symbol of Marital Fidelity. *International Journal of Zoological Investigations*. 2017; 3(1):11-14.
22. Verma AK, Prakash S. Sustainable Conservation and Management of Indian Sarus crane (*Grus antigone antigone*) in and around Alwara Lake of District Kaushambi (U.P.), India. *Indian Journal of Biology*. 2018; 5(2):150-153.
23. Yadav N. Sustainable Development in India. *Journal of Environmental and Social Sciences*. 2016; 3(2):01-04.