International Journal of Environment and Climate Change

Volume 13, Issue 7, Page 674-679, 2023; Article no.IJECC.100005
ISSN: 2581-8627
(Past name: British Journal of Environment & Climate Change, Past ISSN: 2231–4784)

Assessment of Major Problems Faced by Coastal Farmers of India

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Authors' contributions

This work was carried out by authors SB and MS. Authors KL and DK assisted in data compilation and writing the manuscript. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJECC/2023/v13i71919

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/100005

Original Research Article

Received: 08/03/2023
Accepted: 12/05/2023
Published: 17/05/2023

ABSTRACT

The coastal ecosystem is important from both economic and ecological points of view owing to the abundance of natural resources, and diversity and its role in supporting livelihoods. However, coastal agriculture faces multiple challenges such as cyclones, flooding, salinity, seawater intrusion, etc. which affect the production systems and livelihoods of farmers. To identify and rank the problems faced by coastal farmers, we undertook this research study using an online questionnaire with Google-Form and collected responses from 69 respondents covering all the coastal states and Union Territories (UTs) during 2022. The responses were analysed using Garrett's technique for ranking the reported problems. Our study indicated that the problem of pests & diseases (I), weather-related problems (II) and marketing & prices (III) were the major problems faced by farmers in the agriculture & horticulture sector. While in the animal husbandry & poultry sector, fodder shortage, higher feed cost and lower productivity & profitability were the major problems. In the field of fisheries, shortage of good quality fish seeds (I), lower profitability (II) and lower catch (III) were identified as the major problems.

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Keywords: Garrett's ranking; climate change; agriculture; horticulture; fisheries.

1. INTRODUCTION

Coastal regions are the transition areas between land and sea, which are ecologically as well as economically important [1]. Historically, coastal regions have been popular human settlement areas because of easier transportation, and agricultural and industrial activities [2]. Though the coastal regions account for only four per cent of the total land area globally, but support more than 33% of the human population and approximately 90% of the marine fish catch [3]. This demonstrates the importance of the coastal ecosystem in the economy and food security.

In India, the coastal ecosystem accounts for 29.8 million hectares with a share of 9.1% in the country's geographical area [4]. The coastal region in India is spread across nine states (Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Odisha and West Bengal) and two UTs (Pondicherry and Dadra & Nagar Haveli and Daman & Diu) with a total mainland coastline of 5422.6 km [5]. As per the 2011 Census, the coastal region hosts 14.2% of the country's population and 19.5% of the total livestock population. Around 30% of India's population depends on coastal and marine resources [6]. However, the biophysical and environmental conditions of the coastal region differ from the mainland, which makes this region unique and also more challenging. The coastal ecosystem is abundant in natural resources and biodiversity. Cultivation of a wide range of crops such as rice, coconut, spices, etc, rearing of livestock, backyard poultry and fisheries are the important agricultural activities of this region. However, coastal regions are vulnerable to several challenges such as cyclones, flooding, erratic rainfall, salinity, seawater intrusion, sea level rise, increasing ocean acidity and surface temperature, soil degradation, and increasing salt content in water and these factors hamper agriculture production system [7-9]. Due to frequent changes in salinity, tidal surges, moisture stress, and waterlogging, the agricultural production systems in the coastal region are less stable compared to the mainland [10]. To understand the major problems of farmers in coastal regions of India in the fields of agriculture & horticulture, animal husbandry & poultry and fisheries, the present study was undertaken using an online questionnaire covering respondents from all the coastal states and UTs.

2. METHODOLOGY

2.1 Data Collection

During 2022, an online questionnaire through Google Form (https://forms.gle/SQBydBFD7bVCPVUF6) was emailed individually to major stakeholders from the fields of agriculture & horticulture, animal husbandry & poultry and fisheries of the coastal India. The Google Form was also hosted on the ICAR-Central Coastal Agricultural Research Institute's website (https://ccari.icar.gov.in/welcome.php) for receiving the responses. All the responses were electronically collected and compiled. A total of 69 respondents participated in this survey by filling out the information on various problems faced by coastal farmers. The respondents belonged to nine states (Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Odisha and West Bengal) and two UTs (Pondicherry and Dadra & Nagar Haveli and Daman & Diu). Profession-wise summary of respondents is presented in Table 1. Respondents included farmers and farmers' group representatives (21, 30.43%), assistant professors/professors from state agricultural universities and researchers (21, 30.43%) and officials from state government (15, 21.74%) and Krishi Vigyan Kendra (12, 17.39%).

Table 1. Respondents by profession (n=69)

Sl. No.	Profession	Frequency	Per cent
1.	Farmers/Farmers' Groups	21	30.43
2.	State Agril. Universities/Researchers	21	30.43
3.	State Govt. Officials	15	21.74
4.	Subject Matter Specialists/ KVK Programme Coordinators	12	17.39
	Total	**69**	**100.00**

2.2 Garrett's Ranking

To rank the problems faced by the farmers, Garrett's [11] ranking technique was used. Respondents were asked to rank the various problems faced by farmers in the fields of agriculture & horticulture, animal husbandry & poultry and fisheries. These ranks provided by respondents were then converted to score values using the following formula:

Per cent position = 100 $(R_{ij} - 0.5)/N_j$

Where R_{ij} is the rank given for the i^{th} problem by j^{th} respondent; N_j is the number of problems ranked by j^{th} respondent.

Using Garrett's table, the per cent position was converted into scores. Using these scores, for each problem, total scores and mean values of scores were calculated. For ranking these problems, Garrett's ranking was followed wherein problems were ranked from highest to lower rank in the descending order of their mean scores.

3. RESULTS AND DISCUSSION

3.1 Problems Faced by Coastal Farmers in Agriculture & Horticulture Sector

The reported problems faced by the coastal farmers in the field of agriculture & horticulture were clubbed under the major groups of pests & diseases, weather-related problems, marketing & prices, labour scarcity & higher wages, poor soil fertility & salinity, barriers to mechanization, lower productivity of crops, wild animals, unavailability of inputs and lack of awareness & knowledge.

Amongst these problems, the incidence of pests and diseases (I), weather-related problems (II) and marketing & prices (III) were ranked as the major problems based on Garrett's rank (Table 2). Among the weather-related problems, the problem of floods, irregular monsoons, unseasonal rains and gale winds were reported by respondents. Nayak et al. [12] also reported floods and cyclones as the main constraints for agro-enterprises in the coastal region. In pests & diseases, cashew stem and root borer, tea mosquito bug in cashew; wilt in black pepper; mites, rhinoceros beetle & rugose white fly in coconut; *koleroga* and yellow leaf disease in arecanut; fruit fly in mango; viral diseases in papaya and okra were reported. Under marketing & price-related problems, lower prices for produce such as cashew and other plantation crops, price fluctuations, poor marketing intelligence, and lack of marketing platform were reported.

Besides, labour scarcity & higher wages (IV), poor soil fertility & salinity (V) and barriers to mechanization (VI) were also the major problems reported by the respondents. Under labour-related problems, labour shortage, rising wage rates, and lack of skilled labourers for harvesting & spraying in plantation crops were reported. Soil erosion due to heavy rainfall, soil health degradation, seawater intrusion, salinity & water scarcity during summer were the problems under poor soil fertility & salinity. In the case of barriers to mechanization, fragmented land holding, non-availability of low-cost dryers for monsoon season/rain protection and operational inefficiencies due to small land holdings were mentioned. Higher ranks of problem of pests and diseases and weather-related problems depict the importance of biotic and abiotic stresses in the coastal agriculture.

Table 2. Major problems faced by coastal farmers in the field of agriculture & horticulture

Sl. No.	Major problems	Frequency	Percentage	Ranking*
1.	Pests and diseases	21	14.7	I
2.	Weather-related problems	21	14.7	II
3.	Marketing and prices	18	12.6	III
4.	Labour scarcity and higher wages	14	9.8	IV
5.	Poor soil fertility and salinity	11	7.7	V
6.	Barriers to mechanization	8	5.6	VI
7.	Lower productivity of crops	7	4.9	VII
8.	Wild animals	7	4.9	VIII
9.	Unavailability of inputs	7	4.9	IX
10.	Lack of awareness and knowledge	5	3.5	X

** Calculated using Garrett's ranking technique; only major problems are provided in this table*

Table 3. Major problems faced by coastal farmers in the field of animal husbandry & poultry

Sl. No.	Major problems	Frequency	Percentage	Ranking*
1.	Fodder shortage	16	17.0	I
2.	Higher feed cost	11	11.7	II
3.	Lower productivity/profitability	17	18.1	III
4.	Lack of timely veterinary services & facilities	9	9.6	IV
5.	Diseases	11	11.7	V

** Calculated using Garrett's ranking technique; only major problems are provided in this table*

Table 4. Major problems faced by coastal farmers in the field of fisheries

Sl. No.	Major problems	Frequency	Percentage	Ranking*
1.	Shortage of good quality fish seeds	15	21.1	I
2.	Lower profitability	13	18.3	II
3.	Lower catch	6	8.5	III
4.	Lack of storage and infrastructure facilities	6	8.5	IV
5.	Weather-related problems	5	7.0	V
6.	Diseases	5	7.0	VI
7.	Habitat degradation	4	5.6	VII

** Calculated using Garrett's ranking technique; only major problems are provided in this table*

3.2 Problems Faced by Coastal Farmers in Animal Husbandry & Poultry Sector

The problems faced by the coastal farmers in the field of animal husbandry & poultry were grouped under five major problems which are presented in Table 3. Among all reported problems, fodder shortage was ranked first using Garrett's ranking technique, though it ranked second in terms of frequency. Under this, the non-availability of green fodder during winter and summer seasons, reduced availability of dry fodder, and lack of grazing land were the commonly reported problems. Higher feed cost was ranked the second major problem based on Garrett's score. The reported problems under higher feed cost were increasing cost of cattle feed, poultry feed and shortage of feed ingredients. The problem of lower productivity and profitability was ranked third which included low milk yield of *desi* cows, lower milk prices, lower profitability and price fluctuation. Lack of timely veterinary services & facilities was the fourth major problem which included the shortage of qualified veterinarians at the village level, timely availability of doctors, especially for Artificial insemination (AI) and lack of small-scale dairy entrepreneurship facilities. The problem of diseases was ranked fifth with diseases such as foot and mouth disease and mastitis in cattle, poor health of animals, mortality of poultry birds and goats during heavy rains, and production and reproduction losses. Sabapara [13] also reported that high feed costs, shortage of year-round green fodder availability, lower profitability and animal diseases such as repeat breeding, mastitis, etc. were the major problems faced by coastal dairy farmers.

3.3 Problems Faced by Coastal Farmers in the Fisheries Sector

The problems faced by the coastal fish farmers were clubbed under seven major groups (Table 4). Shortage of good quality fish seeds was the major problem based on both Garrett's ranking (I) and frequency (21.1%). Under this problem, lack of the availability of quality seeds/ fingerlings/ stock for different kinds of fishes such as Asian seabass, milkfish, pearl spot, Indian major carp, mussel seed, freshwater ornamental fishes, etc were reported by the respondents. It was also reported that less than 50% of Indian farmers obtained good-quality fish seeds [14]. Lower profitability (18.3%) was the second major problem for fish farmers. Problems reported under this were high inputs costs of feed, probiotics and fuel, low selling price of fish, unregulated fish market, and lower demand for freshwater cultured fishes especially during non-monsoon seasons. Lower catch (8.5%) was ranked third, which included lower marine fish catch, malpractices by big mechanized boats and difficulty in fishing in the sea during high tide. Lack of storage and infrastructure facilities such as the non-availability of proper cold storage, and poor refrigeration facilities was the fourth major problem. Besides these, weather-related problems and diseases were also the major problems reported. The major fish diseases

reported were Red Spot Disease (RSD), Epizootic Ulcerative Syndrome (EUS), dropsy disease and argulosis disease in Indian Major Carps (IMC) and Pangasius fishes, white spot disease, black gill disease, vibriosis, running mortality and white gut disease in shrimps. Habitat degradation was also a major problem which included water pollution, disposal of hospital and industrial wastes into fresh water and brackish water resources, sand and silt sedimentation in the upstream areas of the rivers leading to flooding and loss of fish to the downstream areas.

4. CONCLUSION

The present study compiled the major problems faced by farmers through an online questionnaire and employed Garrett's technique for ranking these problems. The three major problems faced by coastal farmers in the field of agriculture & horticulture were identified: (i) pests & diseases, (ii) weather-related problems and (iii) problems with marketing & prices. In the field of animal husbandry & poultry, the problem of fodder shortage, higher feed cost and lower productivity & profitability were the top three problems. While in the fisheries sector, the coastal farmers faced the problems of shortages of good quality fish seeds, lower profitability and lower catch. Information on the major problems faced by coastal farmers is helpful for researchers in formulating, fine-tuning and prioritising the research programmes especially on developing climate-resilient technologies to withstand the impacts of weather-related problems. There is a need to augment fodder availability in the coastal regions and enhance availability of quality fish seeds through suitable policy measures and extension activities to overcome the challenges of animal husbandry and fisheries sector.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/100005