



ISSN (E): 2277-7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2023; SP-12(12): 2418-2422  
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[www.thepharmajournal.com](http://www.thepharmajournal.com)  
Received: 22-09-2023  
Accepted: 26-10-2023

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## Navigating challenges: An in-depth analysis of limitations and suggestions experienced by NICRA project beneficiaries

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### Abstract

The present study was carried out to analyse the constraints faced by the beneficiaries of NICRA project in Pune, Ahmednagar, and Nandurbar district. A total of 180 respondents from villages with NICRA project implementation and 180 respondents from villages without NICRA project implementation were meticulously selected for the study. The data regarding the Impact of NICRA project were collected using pre-tested interview schedule. Socio economic impact was measured as quantitative aspects with the help of Average increased ground water level (ft.), Average area irrigated (ha) Average No of birds in backyard poultry, Average income from backyard poultry (Rs.), Average number of hybrid cows, Average milk yield/hybrid cow/lactation period (lit.), Cropping intensity, Cropping pattern, Crop diversification with this parameters. It was observed that constraints, Lack of awareness about climate resilience (88.88%) was ranked I, Poor maintenance of soil and water conservation structures due to lack of support from the institutions (83.61%) was ranked II, Poor maintenance of implements kept in custom hiring centre (69.44%), Poor quality roti of drought tolerant variety Phule Vasudha (69.44%), Poor availability and accessibility of short duration drought tolerant crop varieties (69.44%) was ranked IV, Poor functioning of village climate risk management committee (66.66%) was ranked V, Lack of timely information related to climate resilient technologies (63.88 %) was ranked VI, Resistance to change the conventional practices (59.72%) was ranked VII, Language and technical terms were difficult to understand in training programs. (56.11%) was ranked VIII, Lack of involvement of women famers in farm related interventions. (52.77%) was ranked IX, Complex government procedure for taking permission for desalting of river or pond (52.77%) was ranked X.

**Keywords:** NICRA, climate, interventions, KVK, cropping intensity

### Introduction

National Innovations on Climate Resilient Agriculture (NICRA) is a network project of the Indian Council of Agricultural Research (ICAR) launched in February, 2011 with an outlay of Rs 650 crores during XI plan. The project aims to enhance resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration. The research on adaptation and mitigation covers crops, livestock, fisheries and natural resource management. The project consists of four components viz., Strategic Research, Technology Demonstration, Capacity Building and Sponsored/Competitive Grants. The project was formally launched by the Hon'ble Union Minister for Agriculture & Food Processing Industries Shri Sharad Pawarji on 2<sup>nd</sup> February 2011.

### Objectives of NICRA

With this background, the ICAR has launched a major Project entitled, National Initiative on Climate Resilient Agriculture (NICRA) during 2010-11 with an outlay of Rs.350 crores for the XI Plan with the following objectives.

1. To enhance the resilience of Indian agriculture covering crops, livestock and fisheries to climatic variability and climate change through development and application of improved production and risk management technologies.
2. To demonstrate site specific technology packages on farmers' fields for adapting to current climate risks.
3. To enhance the capacity building of scientists and other stakeholders in climate resilient agricultural research and its application.

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## Project Components

Both short term and long terms outputs are expected from the project in terms of new and improved varieties of crops, livestock breeds, management practices that help in adaptation and mitigation and inputs for policy making to mainstream climate resilient agriculture in the developmental planning. The overall expected outcome is enhanced resilience of agricultural production to climate variability in vulnerable regions. The project is comprised of four components.

1. Strategic research on adaptation and mitigation
2. Technology demonstration on farmers' fields to cope with current climate variability
3. Sponsored and competitive research grants to fill critical research gaps
4. Capacity building of different stake holders

## Materials and Methods

The study was carried out in the purposefully selected districts of Pune, Ahmednagar, and Nandurbar. These districts were chosen because the Krishi Vigyan Kendras (KVKs) in these areas had implemented the National Innovations in Climate Resilient Agriculture (NICRA) project in western Maharashtra. These KVKs are affiliated with the VIII Zone, Pune ATARI, and were actively involved in the implementation of the NICRA Project. The present study was conducted in the districts of Pune, Ahmednagar, and Nandurbar to examine the implementation of the NICRA project in western Maharashtra by the Krishi Vigyan Kendras (KVKs) within these districts. From each of the selected districts, one KVK, namely, Baramati from Baramati tahasil, Babhaleshwer from Rahata tahasil, and Nandurbar KVK from Akrani tahasil was chosen for the study. From each selected KVK, two NICRA project implemented villages and two non-NICRA project implemented villages were selected. Thus, total six NICRA project implemented villages and six non-NICRA Project implemented villages was purposively selected for present study. Thus, total 12 Villages were selected for the study. From the villages where the NICRA project was implemented, 30 beneficiaries were selected, and an additional 30 non beneficiaries were chosen from the villages where the NICRA project was not implemented. As a result, a total of 180 respondents from villages with NICRA project implementation and 180 respondents from villages without NICRA project implementation were meticulously selected for the study. Ex-post facto research design was adopted in this study. Socio economic impact was measured as quantitative aspects with the help of Average increased ground water level (ft.), Average area irrigated (ha) Average No of birds in backyard poultry, Average income from backyard poultry (Rs.), Average number of hybrid cows, Average milk yield/hybrid cow/lactation period (lit.), Cropping Intensity, Cropping Pattern, Crop diversification. The statistical methods and tests such as mean, standard deviation, frequency and percentage, Pearson's coefficient of correlation, multiple regression analysis and path analysis was used for the analysis of data. For these constraints and suggestions, the statistical tools were used i.e., frequency, percentage and rank given as per the highest responded

respectively.

## Results and Discussion

### Constraints faced by the beneficiaries in participation of NICRA project

Constraint refers to situations or circumstances that impede or restrict the activity of an individual. In this study, it was operationalized as the items of difficulties faced by respondents to carry out their day-to-day operations for the adoption of climate-resilient technologies. In the present investigation, constraints are grouped into three main categories: technical constraints, social and personal constraints, and economic and financial constraints. The technical constraints were again classified under three subcategories, natural resource management, constraints related to crop and livestock management, and constraints related to institutional management.

Among the major constraints under natural resource management indicated that the inadequate rainfall has resulted in the insufficient restoration of soil and water conservation structures, including check dams, contour bunds, and trenches. (90%) was ranked I, followed by the lack of support from institutions has led to the subpar maintenance of soil and water conservation structures (81.11%), which was ranked II. Farmers' limited participation in determining the allocation of resources, such as land, labor, and finances, hinders the implementation of Natural Resource Management (NRM) activities (71.66%), which was ranked III. The irregular desiltation activity, attributed to low rainfall, has diminished the water storage capacity of these structures. (64.44%) was ranked IV. Due to insufficient rainfall, there is a lack of enthusiasm among farmers to engage in natural resource management (NRM) activities, hindering their effective implementation. (63.88%) was ranked V.

Among the major constraints under crop and livestock management indicated that the non-availability of improved seed in the required quantities (86.66%) was ranked I. Absence of seed treatment practices. (80.00%) was ranked II, irregular deworming activities for livestock's. (78.33) was ranked III, suboptimal utilization of organic manure. (63.33%) was ranked IV for failure to utilize soil test-based nutrient management. (57.22%) was ranked V Among the major constraints under Social and personal constraints indicated that Lack of community involvement in promoting climate-resilient agriculture (CRA) technologies (90.55%) was ranked I, followed by inadequate support from diverse social groups, encompassing those delineated by class and caste. (82.77%) was ranked II; a shortage of motivation among community members to engage proactively (73.88) was ranked III; restricted participation of marginalized sections in community endeavors (70.00) was ranked IV.

Among the major constraints under Economic and financial constraints indicated that insufficient financial assistance (91.66%) was ranked I, followed by substantial investment expenses associated with farm machinery and land development (85.00%) was ranked II, ineffective financial management by local authorities (75.88%) was ranked III, and delayed disbursement of funds for initiating Natural Resource Management (NRM) activities (72.27%) was ranked IV.

**Table 1:** Constraints faced by NICRA Project Beneficiaries

Sr. No	Constraints	Frequency	Percentage	Rank
<b>I.</b>	<b>Technical constraints</b>			
<b>A.</b>	<b>Natural resource management</b>			
1	Inadequate rainfall has resulted in the insufficient restoration of soil and water conservation structures, including check dams, contour bunds, and trenches.	162	90.00	I
2	The lack of support from institutions has led to the subpar maintenance of soil and water conservation structures.	146	81.11	II
3	Farmers' limited participation in determining the allocation of resources, such as land, labor, and finances, hinders the implementation of Natural Resource Management (NRM) activities.	129	71.66	III
4	The irregular desiltation activity, attributed to low rainfall, has diminished the water storage capacity of these structures.	116	64.44	IV
5	Due to insufficient rainfall, there is a lack of enthusiasm among farmers to engage in Natural Resource Management (NRM) activities, hindering their effective implementation.	115	63.88	V
<b>B.</b>	<b>Constraints related to Crop and livestock management</b>			
1	Non availability of improved seed in required quantities	156	86.66	I
2	Absence of seed treatment practices.	144	80.00	II
3	Irregular deworming activities for livestock's.	141	78.33	III
4	Suboptimal utilization of organic manure.	114	63.33	IV
5	Failure to utilize soil test-based nutrient management.	103	57.22	V
<b>C.</b>	<b>Constraints related to institutional management</b>			
1	Farmers experienced insufficient service from Custom Hiring Centres (CHCs).	172	95.55	I
2	The implements stored in the Custom Hiring Centre were poorly maintained.	164	91.11	II
3	There was insufficient maintenance of seeds at the village level, especially in the village seed bank.	147	81.66	III
4	The village's Fodder Bank was not operational.	145	80.55	IV
5	Meetings of the Village Climate Risk Management Committee were irregularly conducted.	136	75.55	V
<b>II</b>	<b>Social and personal constraints</b>			
1	Lack of community involvement in promoting Climate-Resilient Agriculture (CRA) technologies.	163	90.55	I
2	Inadequate support from diverse social groups, encompassing those delineated by class and caste.	149	82.77	II
3	A shortage of motivation among community members to engage proactively.	133	73.88	III
4	Restricted participation of marginalized sections in community endeavours.	126	70.00	IV
<b>III</b>	<b>Economic and financial constraints</b>			
1	Insufficient financial assistance.	165	91.66	I
2	Substantial investment expenses associated with farm machinery and land development.	153	85.00	II
3	Ineffective financial management by local authorities.	142	75.88	III
4	Delayed disbursement of funds for initiating Natural Resource Management (NRM) activities.	131	72.77	IV

### Suggestions given by NICRA Project beneficiaries to overcome constraints.

Among the major Technical Suggestions regarding Natural resource management indicated that the government should conduct periodic desiltation activities to improve water storage capacity (90.00%) was ranked I, followed by Prompt refurbishment of water harvesting structures is essential (79.44%) was ranked II, Farmers should actively participate in determining the location of Natural Resource Management (NRM) activities and contributing their resources (67.22%) was ranked III, The government should excavate water harvesting structures in appropriate locations (66.11%) was ranked IV, Monitoring and evaluation by a team comprising officials and farmers is crucial during the implementation of NRM activities (64.44%) was ranked V.

Among the major Technical Suggestions regarding Crop and livestock management concluded that the Enhance seed production and distribution systems for a steady supply of improved seeds (89.44%) was ranked I, Implement scheduled deworming programs with veterinary support. Conduct awareness sessions for livestock owners, emphasizing the importance of regular deworming (81.11%) was ranked II, Organize awareness programs to educate farmers about seed treatment importance. Provide training on seed treatment methods and advocate the use of affordable, farmer-friendly technologies (74.44%) was ranked III, Promote awareness campaigns on the benefits of organic manure and its proper application (61.11%) was ranked IV, Conduct farmer training on the benefits of soil testing for nutrient management.

Collaborate with agricultural extension services of KVKs to enhance accessibility to (58.88%) was ranked V.

Among the major Technical Suggestions regarding institutional management indicated that the Develop and implement a maintenance plan for CHC equipment, allocate funds for inspections and repairs, and collaborate with local experts for machinery upkeep (97.77%) was ranked I, Implement on-going training for CHC staff to enhance technical skills and customer service. Establish a feedback system for continual improvement in CHC services based on farmers' needs (88.88%) was ranked II, Launch campaigns on seed maintenance, conduct farmer training on storage practices, and establish a monitoring system for seed quality checks to ensure compliance with protocols (78.88%) was ranked III, Conduct a feasibility study to identify reasons for the non-operational Fodder Bank. Collaborate with local entities to revitalize and sustainably manage the Fodder Bank (77.22%) was ranked IV, Set a fixed schedule for committee meetings, communicate it digitally, and appoint a coordinator to ensure regular and timely meetings, fostering active participation and collaboration (76.11%) was ranked V

Among the Social and personal Suggestions indicated that Initiate community programs to raise awareness about the benefits of Climate-Resilient Agriculture (CRA) technologies (93.88%) was ranked I, Implement outreach initiatives to bridge gaps between social groups. Promote collaboration by involving representatives from various classes and castes in planning and decision-making, emphasizing the collective benefits of supporting CRA

technologies (81.11%) was ranked II, Develop incentive programs and recognition schemes to motivate community members. Share success stories to inspire proactive engagement (72.22%) was ranked III, Launch targeted outreach programs for marginalized sections. Provide specialized training, resources, and support for equal participation (67.22%) was ranked IV, Empower women's to engage in technology demonstration activities (61.11%) was ranked V

Among the Economic and financial Suggestions indicated that, Seek increased support from government programmes,

NGOs, or financial institutions (86.66%) was ranked I, Conduct capacity-building for local authorities on efficient financial management. (82.22%) was ranked II, Promote transparency, accountability, and the adoption of modern financial tool (79.44%) was ranked III, Encourage cooperative farming for shared machinery, reducing individual investment. (74.44%) was ranked IV, Authorities should engage in additional follow-up efforts to guide farmers on implementation of climate-resilient technologies (63.88%) was ranked V

**Table 2:** Suggestions from NICRA Project Beneficiaries

Sr. No	Suggestions	Frequency	Percentage	Rank
<b>I.</b>	<b>Technical Suggestions</b>			
<b>A.</b>	<b>Natural resource management</b>			
1	The government should conduct periodic desiltation activities to improve water storage capacity.	162	90.00	I
2	Prompt refurbishment of water harvesting structures is essential.	143	79.44	II
3	Farmers should actively participate in determining the location of Natural Resource Management (NRM) activities and contributing their resources.	121	67.22	III
4	The government should excavate water harvesting structures in appropriate locations.	119	66.11	IV
5	Monitoring and evaluation by a team comprising officials and farmers is crucial during the implementation of NRM activities.	116	64.44	V
<b>B.</b>	<b>Suggestions related to Crop and livestock management</b>			
1	Enhance seed production and distribution systems for a steady supply of improved seeds.	161	89.44	I
2	Implement scheduled deworming programs with veterinary support. Conduct awareness sessions for livestock owners, emphasizing the importance of regular deworming.	146	81.11	II
3	Organize awareness programs to educate farmers about seed treatment importance. Provide training on seed treatment methods and advocate the use of affordable, farmer-friendly technologies.	134	74.44	III
4	Promote awareness campaigns on the benefits of organic manure and its proper application.	110	61.11	IV
5	Conduct farmer training on the benefits of soil testing for nutrient management. Collaborate with agricultural extension services of KVKs to enhance accessibility to soil testing. practices.	106	58.88	V
<b>C.</b>	<b>Suggestions related to institutional management</b>			
1	Develop and implement a maintenance plan for CHC equipment, allocate funds for inspections and repairs, and collaborate with local experts for machinery upkeep.	176	97.77	I
2	Implement on-going training for CHC staff to enhance technical skills and customer service. Establish a feedback system for continual improvement in CHC services based on farmers' needs.	160	88.88	II
3	Launch campaigns on seed maintenance, conduct farmer training on storage practices, and establish a monitoring system for seed quality checks to ensure compliance with protocols.	142	78.88	III
4	Conduct a feasibility study to identify reasons for the non-operational Fodder Bank. Collaborate with local entities to revitalize and sustainably manage the Fodder Bank.	139	77.22	IV
5	Set a fixed schedule for committee meetings, communicate it digitally, and appoint a coordinator to ensure regular and timely meetings, fostering active participation and collaboration.	137	76.11	V
<b>II</b>	<b>Social and personal Suggestions</b>			
1	Initiate community programs to raise awareness about the benefits of Climate-Resilient Agriculture (CRA) technologies.	169	93.88	I
2	Implement outreach initiatives to bridge gaps between social groups. Promote collaboration by involving representatives from various classes and castes in planning and decision-making, emphasizing the collective benefits of supporting CRA technologies.	146	81.11	II
3	Develop incentive programs and recognition schemes to motivate community members. Share success stories to inspire proactive engagement.	130	72.22	III
4	Launch targeted outreach programs for marginalized sections. Provide specialized training, resources, and support for equal participation.	121	67.22	IV
5	Empower women's to engage in technology demonstration activities.	110	61.11	V
<b>III</b>	<b>Economic and financial Suggestions</b>			
1	Seek increased support from government programmes, NGOs, or financial institutions.	156	86.66	I
2	Conduct capacity-building for local authorities on efficient financial management.	148	82.22	II
3	Promote transparency, accountability, and the adoption of modern financial tools.	143	79.44	III
4	Encourage cooperative farming for shared machinery, reducing individual investment.	134	74.44	IV
5.	Authorities should engage in additional follow-up efforts to guide farmers on implementation of climate-resilient technologies.	115	63.88	V

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