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Editors
Rajinder Peshin • Ashok K. Dhawan • Fatima Bano • Karnail S. Risam

Volume 2

Natural Resource Management Ecological Perspectives

Proceeding of the Indian Ecological Society: International Conference
Sher-e-Kashmir University of Agricultural Sciences and
Technology of Jammu, India

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Volume 1

- Theme Papers
- Land and Water Resources,
- Crop-Environment Interactions,
- Horticulture Crops
- Forestry Tree Plantations

Volume 2

- Theme Papers
- Eco-Responsive Livestock and Fisheries Production
- Integrated Nutrient Management
- Integrated Pest Management
- Policies for Sustainable Development of Agriculture
- Success Stories
- Resource Efficient Agriculture System through Public- Private Partnerships

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Preface

Natural resource management (NRM) include improving agro-ecosystem productivity, conserving biodiversity, reducing land degradation, improving water management, sustainability of forests, managing the sustainability of wildlife and fisheries, and mitigating the effects of global climate change. The shrinking per capita natural resources lead to intensive land use and results in further environmental degradation. Widespread, serious and continuing degradation of India's natural resource base is now reflected in increasing difficulties in achieving growth rates in agriculture. Over 120 million hectare (ha) area has been declared degraded. The declining soil health and soil productivity due to loss of organic matter and carbon in most of the arable lands, groundwater declining at a greater pace and water lost due to salinity and alkalinity are threatening the sustainability of Indian agriculture. Natural resource management based on scientific principles plays a crucial role for an inclusive and sustainable growth of agriculture. Therefore, the Indian Ecological Society in collaboration with Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu (SKUAST) has organized an International Conference on Natural Resource Management: Ecological Perspectives, from February 18.20.2016 at beautiful campus of SKUAST, Jammu.

The following theme areas are covered in the conference:

***Land and Water Resources*:** Land resource management and land use planning, water management, management of problematic soils, soil and water conservation, watershed management, water saving technologies, crop diversification, rain-fed / dry-land farming, weed management, development of integrated farming systems, organic farming, resource conservation technologies, traditional ecological knowledge, people's movements in soil - water - development paradigm, technology transfer and impact.

***Crop Environment Interactions*:** Adaptation to changing climate and resilience enhancement, diversification and mitigation through climate smart agriculture, vegetation-atmosphere exchange of green house gases, sustainability of environmental resources, biodiversity conservation and its rational use, crop environment interaction assessment using advanced technologies, shift in the manifestation of insect pests and diseases, improved weather and climate services, ICT enabled early warning systems.

***Integrated Nutrient Management*:** Soil health and nutrition, crop and efficient nutrient management practices, crop residue management, management of pollutants in soil.

***Integrated Pest Management*:** Protection technologies for horticultural and field crops, ecological basis of insect pest/disease management, impact on ecosystem and environment, pesticide residue, spray technology, insect biodiversity, useful insects, IPM programmes and their impact

***Horticulture Crops*:** Genetic resource management in fruit and vegetable crops; vegetative propagating techniques; protected cultivation; intensive production technologies for higher productivity in horticultural crops; climate change mitigation; pre & post-harvest handling and value addition; good agricultural practices in horticultural crops; socio-economic impact of National Horticulture Mission.

***Forestry Tree Plantations*:** Economic, social and ecological valuation, natural resource management, climate change mitigation, biomass energy, tree health and protection, trees outside forests – adoption and management, wood products and composites, eco-tourism, policy, education and training

***Eco-responsive Livestock and Fisheries Production*:** Integrated crop-livestock husbandry for optimum natural resource utilization, environmentally resilient livestock and fisheries management, water economy of livestock operations, health and production interventions for sustenance of fish production, conservation and management of aquatic resources, aquaculture in degraded lands, aquaculture impact on environment, livestock and fisheries for livelihood generation and socio-economic development.

***Policies for Sustainable Development of Agriculture*:** Indicators of sustainable agricultural development, economic and social impacts of technological interventions on agricultural production, impacts of climate change on agriculture, crop livestock interactions, policies, institutions and regulations related to land , water and energy and their impacts, success stories on sustainable development, lessons learned for their up-scaling, strengthening the extension system in India: the role of the private sector.

Promoting Resource Efficient Agriculture System through Public- Private Partnerships: Panel discussion on promoting agricultural systems through public-private partnership and resource efficient agricultural system.

This compendium entitled **"Natural Resource Management: Ecological Perspectives"** divided in two volumes (1 and 2), covering the eight theme areas, includes extended abstracts, lead, oral and poster communications. Volume 1 covers land and water resources, crop-environment interactions, forestry tree plantations and horticulture crops. Volume 2 covers livestock and fisheries production, integrated pest management, and integrated nutrient management and policies for sustainable development of agriculture and success stories. The manuscripts submitted to the conference were reviewed in detail and suitable ones are documented. In all there are 708 articles on all aspects of natural resource management.

We express our sincere thanks to Dr. Pradeep K. Sharma Vice Chancellor Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu and chairperson of the conference for enormous support and encouragement.

We are extremely thankful to various key and lead speakers who agreed to present their work.

Finally we are thankful to all contributors from India and abroad for making useful contributions and timely submissions. The contribution of articles to the conference by industry reflects a synergy between public- private partnership for sustainable development and is a way forward to increase total factor productivity in agricultural research and extension. We regret that, due to overwhelming response we could not include the valuable contributions of the scientist who submitted their work after December 31, 2015.

Rajinder Peshin
Ashok K. Dhawan
Fatima Bano
Karnail S. Risam

Dated: 10.02.2016
Jammu, India

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We wish to thank all the authors, reviewers, invited speakers, members of advisory board and organizing team, student-volunteers and everyone who have contributed in the successful organization of the conference.

Rajinder Peshin
Ashok K. Dhawan
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Integrating Action Research in Extension-Education Towards Sustainable Livelihood

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Keywords: action research, extension-education, sustainable livelihood, rural areas

Introduction

Deforestation, un-treated waste, polluted water, natural disasters are among natural resources and environmental issues faced nowadays. A well designed and implemented extension-education can positively contribute to community awareness, initiatives and concrete actions for sustainable development. This paper aims to present action research in extension-education to support community actions in environmental management. Action research according to Reason and Bradbury (2008) is "an approach used in designing studies which seek both to inform and influence practice." Research participants were community groups facing environmental problems such as deforestation and domestic waste and those who exposure to natural disaster including drought and flood.

Materials and Methods

Action research was used to develop participation from related stakeholders. The research involved community groups, local government, and environmental facilitators from six villages in Bandung and Bogor, West Java. Each community group has 10 to 15 members. The villages were Sunten Jaya, Lebak Siliwangi, Dayeuh Kolot, Petir, Cibeber, and Benteng The environmental issues faced by community groups including domestic and dairy waste, landslide, eroded land, polluted water, drought, and frequent floods. The steps of action research were modified as follows: (i) designing and planning, (ii) actions for improvement, (iii) monitoring and evaluation, and (iv) step forwards for sustainable livelihood.

Results and Discussion

Table 1 summarizes the phase of the research and community learning from the process. Community awareness to environmental issues vary according to knowledge and information about environmental issues received from various sources. Radio, television, paper, and cellular phone are communication media used by most members of community groups to gather information. Extension in the form of environmental education is still limited integrated in the program. Community initiatives and actions in managing the environment in each village vary depended on the environmental issues, capacity in water, land, and forest conservation, support from the government, leadership from local leaders, and partnership.

The use of action research is possible to facilitate the changes in the context of encourage movement and concrete actions from multi stakeholders. Ownership to the contextual issues (conservation, rehabilitation, and protection) has increased when the community groups are able to conserve the nature and environment together with running income generating activity as well as strengthening social bonding.

To conclude, there is an urgent needs for environmental-education integrated in extension services to strengthen community initiatives and actions in natural and environmental management. Action research can be integrated in extension-education services as an approach in change transformation through people participation, problem solving, and empowerment.

References

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Table 1: Learning and actions from integrating action research in environmental extension-education

Step of action research	Process of participation development	Learning and actions from community groups
Design and planning	Community groups are actors of the action research. The groups agree to promote the change The groups living in upstream of the watershed are committed to manage waste better, conserve the water, and plant annual crops. The groups living in downstream of watershed are interested in developing early warning system from flood. The groups living in the middle stream plan to strengthen groups for caring the river, manage the 3R (reuse, reduce, recycle)	Designing and planning is the essential part of the change that needed to be understood by all participants of the group
Actions for improvement	Cadres in each village work together with the community group, facilitated by change agents through extension education. The actions include: awareness to natural resources management and environmental issues	Actions can be executed by the community themselves, supported from external agents may be needed to accelerate the movement and strengthen community groups capacities in transforming the change
Monitoring and evaluation	The community groups check the change during the program. Participatory monitoring and evaluation is implemented following the indicators set during designing and planning phase	Monitoring and evaluation (observe) enrich the learning process toward sustainable livelihood
Step forwards	Extension-education services need to continue to address the issue on nature resources and environmental management as well as maintaining socio-economic of the rural community. The community groups continue to work on the actions towards sustainable livelihood.	Continuing change for the future needs co-operation among community members, cadres, local leaders, and government support through its policy and program addressing environmental issues in each regions, different regions have different context, needs, and potentials.