

POLICY BRIEF

Traditional and local knowledge to disaster risk reduction

July 2023 | No. 03

Local crop varieties strengthen community resilience to disasters: a policy brief for Nepal, India and Bangladesh

Prakash K. Paudel^{*}, Meena Bohara¹, Raja Ram Chandra Timilsina¹

¹ Center for Conservation Biology, Kathmandu Institute of Applied Sciences, Kathmandu, Nepal

SUMMARY

Agriculture is vital for livelihoods in Nepal, India and Bangladesh. Local communities in these countries have developed unique farming systems well-adapted to their environments. This includes the use of local crop varieties with unique traits like flood, drought and disease resistance. Thus, community resilience to disasters was in place for centuries. However, such practices are at risk due to the promotion of foreign and/or hybrid seeds. This policy brief draws case studies from Nepal, India and Bangladesh, and highlights the value of local crop varieties in strengthening community resilience to disasters.

Background

Agriculture plays a pivotal role in the sustaining livelihoods of a large portion of the population in India, Bangladesh, and Nepal. These countries are frequently confronted with severe drought and floods, resulting in devastating consequences for agriculture-dependent local communities (World Bank 2012). Government agencies promote hybrid crop varieties to improve food security through several instruments such as subsidies, direct aid and training and expert suggestions. While such varieties have high yields and offer other comparative advantages (e. g., short harvesting time, and disease resistance), a complete ignorance of local varieties risks increasing vulnerability to disasters due to several ways. Firstly, it is found that many local varieties have specific traits such as resistance to drought, disease and flood etc. that are often overlooked during the selection of varieties. Second, hybrid varieties, in most cases, demand high investments in terms of fertilizers and labour inputs. Third, farmers have to bear the recurrent costs of purchasing expensive seeds every year. Fourth, there is a risk of loss of genetic pool. This policy brief brings three case studies from Nepal, India and Bangladesh to highlight how local crop varieties strengthen community resilience to disasters and

provide some policy recommendations.

Challenges

Local crop varieties have evolved and possess inherent traits that enable them to withstand the region's specific climatic conditions, including drought and flood resistance (Toulotte et al. 2022). However, the promotion and preservation of local crop varieties face several challenges in the context of India, Bangladesh, and Nepal, particularly in flood and drought-prone regions (Upadhyaya et al. 2016; Oladosu et al. 2020).

Changing agricultural practices, and the widespread adoption of modern high-yielding varieties have resulted in the neglect and loss of traditional crop varieties (Medury 2008; Upadhyaya et al. 2016). There is often a lack of proper guidance and knowledge regarding the selection and cultivation of crop varieties, resulting in haphazard practices of experimenting with new varieties without an adequate understanding of their suitability to the local conditions (Sambo 2014). Additionally, the reliance on a limited range of modern high-yielding varieties exacerbates the risks to food security since these varieties may be more susceptible to droughts or floods, leading to crop failures and reduced



Figure 1. A local woman showing seeds of Charamchur rice

* Coresponding author: Center for Conservation Biology, Kathmandu Institute of Applied Sciences, Kathmandu, Nepal

E-mail addresses: pk.paudel@gmail.com (PK Paudel)

agricultural productivity (Medury 2008; Toulotte et al. 2022). Besides, the continuous adoption of modern varieties over traditional local varieties contributes to genetic erosion, wherein the genetic diversity and resilience of crops diminish over time (Atapattu & Kodituwakku 2009).

Case studies

Nepal

Charamchur, Basmati, and Kariyakamod are used to cultivate in Srilanka Tappu, a small village adjacent to the Koshi River. These varieties are known for their remarkable ability to withstand floods due to their taller stature as compared to the hybrid ones. However, despite this advantage, their yields are relatively low and take a long time to harvest. Moreover, the fragrance of this rice variety attracted wild animals such as wild water buffaloes and birds, leading to significant crop depredation. As a solution, the local community opted to cultivate hybrid rice varieties, which offered higher yields within a shorter period and thus minimized losses caused by animal intrusions.

India

In India, local farmers are discouraged from cultivating local resilient varieties due to a lack of government support, low market prices, and the introduction of high-yielding seed varieties (Acharyya & Mishra 2018). *Desariya Dhan*, an indigenous rice variety originating from the floodplains of Bihar and Uttar Pradesh, exhibits unique adaptations to thrive in floodwaters. It grows in depths of five to six feet, elongating its stem as the water level rises. However, the cultivation of *Desariya Dhan* is declining due to increased flooding caused by embankment extensions and sluice gate installations. The variety cannot withstand water levels beyond six to seven feet, leading to its decline. Additionally, alternative crops like maize in Sahorwa also face losses from waterlogging and sudden floods (Jamwal 2017).

Bangladesh

The occurrence of floods in Bangladesh has influenced the choice and enhancement of flood-resistant varieties. *Chamara*, an effective flood-resistant variety, is specifically suitable for the low-lying floodplain areas in Tangail, whereas farmers in other floodplain regions might opt for alternative flood-resistant varieties like Hijoldigha. Unfortunately, the government's emphasis on modern varieties and the expansion of the commercial seed market have undermined farmers' resilience to climate-related disasters such as floods, droughts, and salinity (Andolon 2020).

Policy Recommendations:

1. Agriculture departments in all these three countries routinely provide incentives in terms of subsidies and grants for cultivating high-yielding crop varieties. In many cases, there is direct distribution of hybrid seeds. However, such supports are done ad hoc, with little or no consideration of ecological, social and climatic acceptability. Governments should develop a policy for the continued use of local varieties, at least some part of the field, as a reserve of local production and in-situ conservation of such varieties. This will encourage adoption and investment in traditional seeds, making them economically viable alternatives.

2. The government should invest in research and development programs on local crop varieties. There is a need for collaboration among research institutions, universities, and farmers that requires consistent policy and funding support from governments.

References

- Acharyya T, Mishra M. 2018. Problems and Prospects of Cultivating Indigenous Flood and Brackish Water-Resistant Varieties of Paddy in the Context of Projected Sea Level Rise: A Case Study from Karnataka, India. Pages 19–26 in Hashmi MZ, Varma A, editors. *Environmental Pollution of Paddy Soils*. Springer International Publishing, Cham. Available from https://doi.org/10.1007/978-3-319-93671-0_2 (accessed June 9, 2023).
- Andolon N. 2020. Bangladesh: Community Seed Wealth Centers and stress-tolerant crop varieties. Available from <http://ubinig.org> (accessed June 9, 2023).
- Atapattu SS, Kodituwakku DC. 2009. Agriculture in South Asia and its implications on downstream health and sustainability: a review. *Agricultural Water Management* 96:361–373. Elsevier.
- Jamwal N. 2017, October 18. Flood-resistant rice fights for survival. Available from <https://indiaclimatedialogue.net/2017/10/18/flood-resistant-desariya-rice-fights-survival/> (accessed June 9, 2023).
- Medury U. 2008. Toward Disaster Resilient Communities: A New Approach for South Asia and Africa. Pages 367–384 *Disaster Management Handbook*. CRC Press.
- Oladosu Y, Rafii MY, Arolu F, Chukwu SC, Muhammad I, Kareem I, Salisu MA, Arolu IW. 2020. Submergence tolerance in rice: Review of mechanism, breeding and, prospects. *Sustainability* 12:1632. MDPI.
- Sambo BE. 2014. Endangered, neglected, indigenous resilient crops: a potential against climate change impact for sustainable crop productivity and food security. *IOSR Journal of Agriculture and Veterinary Science* 7:34–41.
- Toulotte JM, Pantazopoulou CK, Sanclemente MA, Voeselek LA, Sasidharan R. 2022. Water stress resilient cereal crops: Lessons from wild relatives. *Journal of Integrative Plant Biology* 64:412–430. Wiley Online Library.
- Upadhyaya D, Dhakal R, Khadka K, Rana S, Acharya P, Rana R, Chaudhary P. 2016. Local knowledge of climate-induced traits in rice for improving crop yield, food security and climate resilience. *Int. Agric. Innov. Res. J* 5:385–396.
- World Bank. 2012. Disaster Risk Management in South Asia : A Regional Overview. Available from <https://openknowledge.worldbank.org/handle/10986/13218>.

About Us

This policy brief is part of a project titled “*Enhancing ecosystem-based adaptation to disaster risk reduction in the Himalayan river basin: Integrating traditional and local knowledge in disaster management plan in Nepal, India and Bangladesh*” which is funded by Asia Pacific Network for Global Change Research. More information about the project can be found on the [APN](#)

and [KIAS](#) websites.

Citation

Paudel, P. K., Bohara, M., Timilsina, R. R. C. (2023). Local crop varieties strengthen community resilience to disasters: a policy brief for Nepal, India and Bangladesh. Policy Brief No. 03. Center for Conservation Biology, Kathmandu Institute of Applied Sciences, Kathmandu, Nepal.