Food Systems and Agrobiodiversity in the Mountains of Central Asia

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Mountain Societies Research Institute

The Mountain Societies Research Institute (MSRI) operates at the interface of science and society in Central Asia. As part of the University of Central Asia and the wider Aga Khan Development Network, MSRI engages in transdisciplinary research for development and regularly seeks to strengthen regional capacities, to inform policy and practice, and to promote open dialogue among key stakeholders about development issues. MSRI thus aims to improve the well-being and resilience of mountain communities in the context of rapidly changing economic, sociocultural, political, and environmental conditions. MSRI's integrated approach to research, both with and for the benefit of mountain societies, demands simultaneous understanding of social and ecological factors operating at multiple spatial and temporal scales. Broadly embedded within the framework of the Sustainable Development Goals, and more specifically the Sustainable Mountain Development agenda, the research and affiliated activities at MSRI also aim to elucidate and highlight the development challenges and opportunities of a long-neglected part of the world, greater Central Asia, extending from the Caucasus to western China.

Integrated food systems in Badakhshan

An emerging need has become apparent for targeted research on sustainable food systems and food and nutrition security. Working closely with a range of research and development partners, the Mountain Societies Research Institute (MSRI) has begun to engage in food systems research over the past couple of years in Kyrgyzstan, Tajikistan, and Afghanistan. Food systems are always multifaceted and incorporate complex livelihood considerations as well as social and cultural norms and traditions, and it is important to understand the current realities as well as predicted future scenarios under climate change. Enhancing the resilience and adaptive capacities of mountain societies and their environments in light of known or anticipated shocks and pressures is key to ensuring sustainable development. "Food supplies and support for agriculture are too important to be left to market forces alone" (UNCTAD 2010). In mountainous regions with limited agricultural lands, rugged topography, and large elevational gradients, the preservation of agrobiodiversity and an appreciation of traditional knowledge about food systems are essential ingredients of a sustainable future in which development needs are met in a way that maintains environmental safeguards and cultural continuity (Figure 1).

Outstanding agrobiodiversity is harbored by rural communities in the Hindu Kush and Pamir mountains on both sides of the Tajik–Afghan border, in the greater Badakhshan region (Giuliani et al 2011) (Figure 2). Valuable genetic resources are coupled with local and traditional knowledge about crops, wild plants, and livestock, which have co-evolved together over generations (Mijatovic et al 2013). Highly adapted to specific environmental conditions, these integrated food systems, with both social and ecological dimensions, are valuable in their ability to absorb disturbances and maintain function; in their community-level organizational qualities, which incorporate specialist knowledge and promote sharing of resources; and in their capacity to learn and adapt to change (Mijatovic et al 2013). As such, maintaining traditional knowledge and community-sourced production systems, including the genetic basis of locally adapted plants and livestock, is among the most important actions that can be taken to future-proof mountain societies.

However, many threats to the socioeconomic and environmental sustainability of food systems remain in these fragile mountain environments, both long standing and emerging. Major threats to agrobiodiversity and the long-term viability of food systems in greater Badakhshan include climate change, external markets, and globalization. Climate change is more acute in mountain regions globally than in other biomes, with significant impact on ecosystem services, especially in terms of amount and timing of water availability. Food systems in mountains are deeply reliant on ecosystem services (Jackson et al 2007), and any loss of (agro)biodiversity can exacerbate environmental degradation, diminishing food and nutrition security as well as the future adaptive capacity of mountain communities.

The priorities of external market forces often differ from those of local communities. While local people may be acutely aware of the benefits of maintaining a diversity of crops and livestock, which have value that extends well beyond the purely economic (Hodges et al 2014), more distant urban markets generally prioritize attributes such as appearance and durability (Giuliani et al 2011)—often leading to the replacement of traditional crops with introduced varieties and other cash crops. If unchecked, this process often harms or displaces more resilient traditional production systems (Johns et al 2013).

Other forms of globalization may also impact food systems and traditional knowledge in mountain

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FIGURE 1 Agricultural village in Badakhshan, Afghanistan. (Photo by Matthew Emslie-Smith)

areas—for example, through outmigration to urban centers (with a resulting loss of practical knowledge) or the receipt of remittances and new ideas (which can affect how natural resources are managed). The shrinking or homogenizing of the world and loss of sociocultural diversity can have major implications for agrobiodiversity and traditional knowledge systems, generally reducing mountain societies' capacity to adapt to regional and global changes (Foggin 2016; Schmidt-Vogt et al 2016).

To help fill some of the knowledge gaps and to better support development programming, MSRI has recently undertaken several targeted studies about socioecological production landscapes and food systems. Two examples are provided here.

Contribution of medicinal and aromatic plants to food and nutrition security

A study of medicinal and aromatic plants (MAPs) in the Pamir Mountains revealed that these are crucial components of traditional local food systems, contributing critically to the nutritional security and resilience of households in times of crop failure or other hardship. MAPs consist of a vast array of woody plants and herbs used for medical treatment or human consumption and are typically defined within traditional knowledge systems. When formal medical services are absent due to war or conflict, MAPs may further play a critical role in people's health strategies, supplementing or often substituting for modern or Western treatments. MAPs can also be used as a form of currency, exchanged between poor rural households as well as with more affluent, urban, or migrant households.

MAPs occurring in mountainous Badakhshan were revealed to be in high demand, but their collection and sale are generally unsystematic and most activities in this informal sector lack professionalization. Furthermore, cultivation of MAPs on private land is not recognized as a viable livelihood

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FIGURE 2 Map of greater Badakhshan. (Map by Evgenii Shibkov)

strategy, largely due to the scarcity of agricultural land, informal governance structures, and weak regulatory frameworks, which limit the benefits that can be derived from MAP cultivation. Under current conditions, there appears to be little incentive for people to invest in and care for MAP resources.

These initial findings point to the need to develop a more enabling integrative MAP strategy that incorporates conservation of traditional knowledge with a mapping of MAPs and other natural resources as well as environmental and socioeconomic impact assessments.

Tajik Pamir rangelands as sustainable food production landscapes

Residents in the high Pamir region of Tajikistan have always depended on natural resources to sustain their livelihoods, primarily through nomadic herding practices that have developed over centuries (Figure 3). In recent decades, however, traditional sustainable management and governance structures have undergone varying forms and degrees of disruption as a result of regional and international sociopolitical shifts. In 2016–2017, a regional comparative study was carried out to assess rangeland conditions and to determine the effects of livestock production systems and wildlife use on pasture quality and productivity near Zorkul Lake and the headwaters of the Panj River (also known as the Amu Darya, and in antiquity as the Oxus River). The study highlighted similarities and some differences in herding practices between 2 pastoralist subcommunities, differing mainly in seasonal livestock movements and pasture rotation. More pasture degradation and livestock health problems were noted where local pasture management institutions were absent. Mechanisms allowing greater coordination of effort, such as pastoralist associations, also enabled greater community-level mobilization and a wider range of benefits. These findings further emphasize the importance of acknowledging and supporting community efforts to practice sustainable land use, as the resilience of integrated food systems in arid and fragile ecosystems is nearly always based on both sociocultural and environmental elements.

Future strategic directions

Beyond research per se, MSRI engages in other strategic activities in support of sustainable mountain development. For example, embedded within the Aga Khan Development Network's Mountain Universities Partnership program to engage with and serve the needs of other universities and constituent mountain societies in the Tian Shan,

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FIGURE 3 Nomadic pastoralism practiced by Kyrgyz herders near Zorkul Lake, 2017. (Photo by Marc Foggin)

Pamir, and Karakoram mountain ranges traversing Kyrgyzstan, Tajikistan, Afghanistan, and Pakistan, MSRI has begun the capacity-building–oriented Pathways to Innovation project, supported by the International Development Research Centre. This project aims to strengthen 2 universities in Afghanistan and 1 university in Tajikistan by supporting a suite of locally developed agricultural and sustainable development projects and codeveloping and delivering a certificate program in natural resources management. In the near future, MSRI will also develop a master's program in mountain development, focused on mountain livelihoods and sustainability within the context of global change. Special attention will be given to climate change and adaptation, food systems and the management and governance of natural resources, biodiversity and ecosystem services, mountain hazards, disaster risk reduction, and socioeconomic development.

With close proximity to China and the unprecedented scale and anticipated impacts of China's Belt and Road Initiative (Sternberg et al 2017; Foggin 2018a; Lechner et al 2018), MSRI has also begun to build partnerships with Chinese academic institutions. MSRI organized and hosted the international Silk Roads in the Mountains of Central Asia workshop in Dushanbe, Tajikistan, on 3–4 October 2017, culminating in the signing of the Dushanbe Declaration (Foggin 2018b). MSRI is now convening a special symposium on Mainstreaming Conservation in China's Belt and Road Initiative, to be held during the Conservation Asia 2018 conference in Bishkek, Kyrgyzstan, on 6–10 August 2018.

Even more prominently, the University of Central Asia and the government of Kyrgyzstan will cohost the World Mountain Forum 2018: Mountains in a Changing World—Strengthening Partnerships and Pathways towards a Thriving Mountain Future, on 23–26 October 2018 (see www.wmf2018.org), with support from the Swiss Agency for Development and Cooperation and other development partners—bringing together representatives of local communities and civil society from mountain regions globally along with representatives of the development, academic, government, and business sectors. Two of the themes planned for the forum are climate change and water as well as poverty and food systems, providing ample opportunity for the productive exchange of ideas, lessons learned, and solutions identified from around

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the world that can help inform and guide future development programming in our own areas of interest.

The research, workshops, conferences, and partnerships outlined here clearly illustrate the enlarged thematic and geographic scope of MSRI's endeavors. Development research on food systems, writ large, is now established and set to continue. This research includes the documentation, protection, and strengthening of agrobiodiversity and its utilization—and of traditional knowledge and practice systems more generally. All these processes that will be further supported by cross-sectoral collaborations and broad partnerships with mountain communities, other research institutions, and private-sector partners working together to promote more sustainable food systems in the mountains of Central Asia.

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