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Thomas Breu, Daniel Maselli, and Hans Hurni

Knowledge for Sustainable Development in the Tajik Pamir Mountains

Initiating a process of informed decision-making for sustainable development requires the following: a) the values and objectives to be pursued need to be negotiated among all concerned stakeholders of a specific territorial unit; b) these stakeholders should have access to a comparable level of knowledge; and c) the decisions taken and the subsequent actions initiated should have a positive impact on all dimensions of sustainability. In the remote Tajik Pamir mountains, a special effort was made to fulfill the above 3 principles by developing and applying a new methodological approach to sustainable development.

The paper presents the results of a multi-year baseline study project in which 10 sectors ranging from agriculture to natural hazards were assessed by a transdisciplinary Swiss–Tajik research team. This knowledge base was enhanced in a development strategy workshop that brought together stakeholders from the local to the international levels. The methodology applied was found appropriate to initiate a broad reflection and negotiation process among various stakeholder groups, leading to a joint identification of possible measures to be taken. Knowledge—and its enhancement through the involvement of all stakeholder levels—appeared to be an effective carrier of innovation and changes of attitudes, thus containing the potential to effectively contribute to sustainable development in marginalized and resource-poor mountain areas.

Keywords: *Sustainable regional mountain development; transdisciplinarity; multi-level stakeholder process; knowledge generation; Pamirs; Tajikistan.*

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Introduction

The collapse of the Soviet Union in 1991 brought independence to Tajikistan as well as to all the other republics of Central Asia. The subsequent transition from a planned economy to a market economy has led to profound changes in these countries. Marginal areas such as the Pamir mountains have been particularly affected by the process of political and economic transformation.

When Tajikistan was part of the Soviet Union, Gorno Badakhshan Autonomous Oblast (GBAO)—the home of the Tajik Pamirs—received considerable subsidies for energy, food, and infrastructure. As soon as the country became independent, however, these subsidies ceased. The impact of this abrupt withdrawal of economic support was aggravated by the civil war that broke out in other regions of Tajikistan in 1992 and brought 55,000 refugees (Herbers 2001) to GBAO. Famine was only averted by continuous massive and still ongoing external relief efforts by international agencies.

Previous detailed baseline research by the authors shows that today, GBAO is characterized by widespread poverty, structural economic problems, decaying infrastructure, and dependence on external humanitarian aid (Breu and Hurni 2003). Barter trade and subsistence agriculture have practically replaced the former modest cash economy. As a result of the forced return to a subsistence-oriented economy in a population that has quadrupled since 1926, widespread signs of natural resource degradation can be observed. Promoting sustainable development in the Tajik Pamirs is thus a major challenge from several points of view: political, economic, social, and ecological.

The aim of the partnership research project presented in this paper was to develop a new methodological approach to sustainable regional development. By elaborating a broadly based development strategy with several stakeholder groups, action-oriented knowledge was generated. This greatly enhanced the previously established thematic knowledge system concerned with the status and dynamics of a specific mountain region.

Characteristics of the Pamir mountains

The Pamir mountains, or Pamirs, also known as the 'Roof of the World,' extend across Afghanistan, China, Kyrgyzstan, Pakistan, and Tajikistan. The heart of the Pamir range, the High Pamirs, is located in Tajikistan's mountainous province of GBAO (Figure 1). The Pamirs comprise about 63,700 km^2 and have the highest peak in the Commonwealth of Independent States (CIS), Peak Somoni, at 7495 m. Population growth was actively promoted in GBAO during the Soviet era for geostrategic reasons, with the population increasing from 56,000 in 1926 to 220,000 in 2000 (GBAO Statistical Department 2000; AKF 2002).

The Tajik Pamirs are generally divided into an eastern and a western part. Due to extreme bio-physical conditions, they developed into a remarkable landscape, with moon-like high plateaus (3000–4000 m), rounded massifs, and large valley floors in the east. In the west, deeply incised valleys with traditional settlements nestled on alluvial fans are topped by glaciers. The highest ridges of the Western Pamirs, Hindu Kush, and Himalaya form a barrier against moisture from the Indian and Atlantic Oceans (Badenkov 1992). Hence

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FIGURE 1 The Pamir mountains in Central Asia. (Map by Andreas Brodbeck)

the eastern part has a pronounced continental climate, with long winters and less than 100 mm average annual precipitation, compared to 100 to 500 mm in the valleys of the west. Land resources—except for water—are very scarce. Most territory is barren. Biomass production is very limited, with median vegetation periods in irrigated areas of only 102 days in the east and 204 days in the west (values based on spatial interpolation of meteorological data, 1980–1998).

In the Western Pamirs total arable land in 2001 was 245 km^2, corresponding to only 0.4% of GBAO (Hergarten 2004). According to Herbers (2001), the main current economic activity among the predominant Ismaili communities living in the Western Pamirs is "combined mountain agriculture," characterized by a combination of crop cultivation on irrigated land and stockbreeding based on seasonal exploitation of resources at different altitudes. In the Eastern Pamirs, due to the dominance of desert soils, only very extensive land use such as livestock grazing is possible for a semi-nomadic population primarily of Kyrgyz origin. Only a few areas covered by mountain steppe soils along meandering rivers can be used for fodder production. According to Hergarten (2004), the total pastureland area in 2001 was 7940 km^2, or 12.5% of GBAO. Hence more than 85% of the territory of GBAO has no productive agropastoral potential.

Knowledge generation and strategy development

In order to elaborate a sustainable development strategy, a thematic knowledge system providing information on the current state, trends, and mechanisms in the social and ecological domains was established. To compile the necessary knowledge, different disciplinary and interdisciplinary studies and field surveys involving more than 30 local and foreign experts were carried out in GBAO between 2001 and 2004. These studies tried to build whenever possible on very comprehensive scientific work done in the Pamirs by scholars from the former USSR. The 10 sectors addressed were agriculture, governance, infrastructure, energy, industry, services, tourism, biodiversity, mining potential, and natural hazard risks. Local conditions and processes were appraised through participatory fieldwork, and household and community strategy studies carried out in selected villages of GBAO. The methodology of the Sustainable Development Appraisal (SDA) was employed in these studies (Hurni 2000). SDA is preferably applied in interdisciplinary teams, in collaboration with local and external stakeholders, using a transdisciplinary approach, ie integrating both scientific and local knowledge to achieve a common view of needs, options, and constraints.

To enhance the analytical capacities of the thematic knowledge system, a geographic information system (GIS) was developed, integrating as much of the information from the studies as possible. Based on this GIS, different spatial models were elaborated and development options compared. This helped to understand key problems as well as to support the development of a shared vision (Sayer and Campbell 2004), thus ultimately contributing to the overall strategic development process.

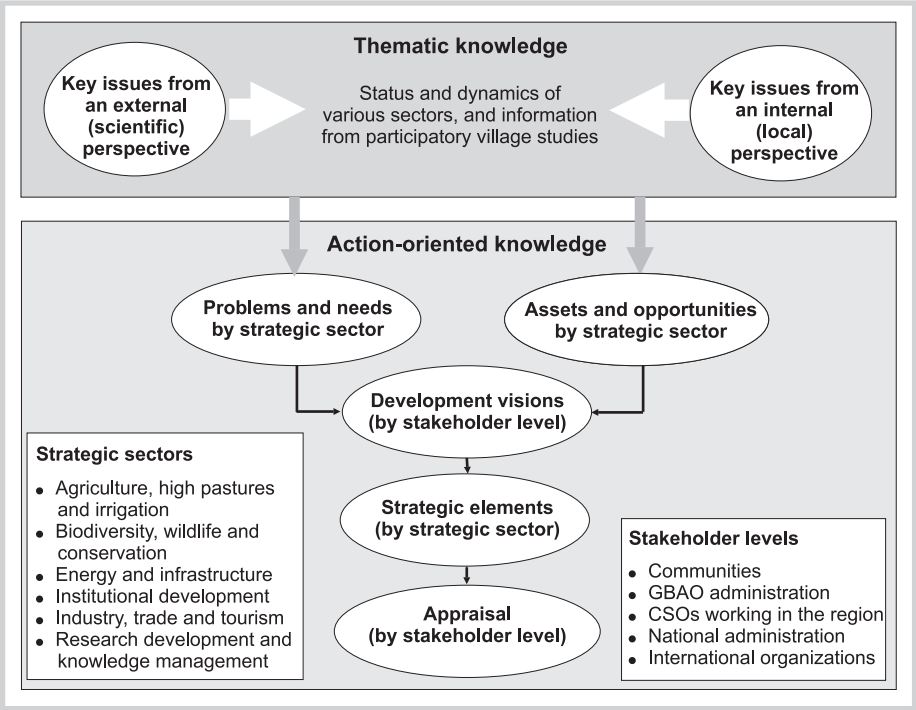
A potentially successful strategy of sustainable development must integrate and reconcile economic, social, and ecological objectives. To achieve this, the strategy must be accepted and supported by all concerned stakeholders. Accordingly, priorities must be developed and agreed on in a participatory manner, and dialogue must be transparent. To this purpose a 4-day workshop was held in the region in accordance with the OECD/DAC principle (2001) that "effective strategies for sustainable development bring together the aspirations and capacities of government, civil society and the private sector to create a vision for the future." By adapting the multi-level stakeholder approach to sustainable land management (Hurni 1998), a practical methodological approach was developed (Figure 2).

A multi-level stakeholder workshop for strategy development

The 4-day workshop held in Khorog (GBAO) in October 2002 addressed 6 strategic sectors, involved 5 stakeholder levels, and provided a platform for exchange across disciplinary boundaries and for generation of new, action-oriented knowledge by taking into account specific perspectives at different stakeholder levels. In 2 group sessions, core problems and major opportunities

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FIGURE 2 Sequence of elements dealt with in the Strategy Workshop for Sustainable Development of the Tajik Pamirs. (Source: Breu and Hurni 2003)



for sustainable development in the Tajik Pamirs were identified. Development visions for the year 2025 were then elaborated and compared by representatives of different stakeholder groups. On this basis, 18 strategic objectives were elaborated and appraised by each stakeholder group in terms of importance and urgency. As a result, concrete development priorities were agreed upon and areas requiring further negotiation among the stakeholders made transparent.

The workshop was attended by a total of 89 participants evenly representing the 5 stakeholder levels. The authors invited the participants from the international level and from NGOs, while the GBAO government named participants at the provincial and national levels. Adequate participation at the local stakeholder level, which is often inadequately represented (Hemmati 2002), was secured through the nomination of key informants, politicians, and members of the independent village organizations who took part in the 3 village studies carried out for this study. This selection procedure secured the legitimacy of the multi-stakeholder process and ensured that the participants could accept the workshop outcomes.

Knowledge results: status and dynamics of the Tajik Pamirs

The analysis carried out made it possible to achieve a synthesis and an evaluation of the overall situation and trends in GBAO. These were oriented towards the 3 dimensions of sustainability—society, ecology, and economics—and the respective objectives outlined in Harris (2000).

The economic dimension

Given the very limited productive potential in GBAO, an economically viable system has always been very difficult to install. Prior to integration into the Soviet Union in 1920, the number of people living in the area was consequently extremely low. Subsistence agriculture, including livestock production, was the main economic activity. Only a negligible percentage of household production was linked to trade. In the Soviet era, dependence on the central state increased tremendously, particularly with regard to energy, food, and financial resources. Major external efforts were made to develop transport and communication infrastructure, as well as public services, which eventually helped to secure the borders to China and Afghanistan. These were demarcated in 1895 during the so-called “Great Game” (Kreutzmann 2002). Attractive family allowances and other incentives for immigration led to a disproportional population increase. The agricultural sector was totally transformed from a subsistence-based household-centered system to a centrally organized commodity-oriented system. Only a few industry and infrastructure projects contributed to the evolution of a fairly small secondary sector. Similarly, the service sector also developed very modestly while agriculture became highly specialized, thus requiring skilled labor. After Independence the most dramatic change occurred in agriculture,

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which returned to household-centered, subsistence-oriented production (Figure 3), absorbing trained physicians, teachers and technicians as well as other people who lost their government jobs (Kreutzmann 2002). Only the hydropower sector remained intact. It now constitutes the "backbone" of the non-farm economy, as small as that may be.

The current economy is thus highly underdeveloped. This is reflected by state revenues generated within the GBAO: 93% of the budget consists of direct transfers from the central Tajik government, while only 7% is generated locally through taxes and fees. International financial transfers from outside GBAO into the region are dominated by technical cooperation, humanitarian aid, and remittances from family members working mainly in the former states of the USSR. The dominance of international cooperation, with a much greater volume than the government, led to a parallel system of government services, particularly in the fields of infrastructure investment, health, and educational services.

Only recently have small-scale industries and manufacturing begun to emerge. The previously centralized livestock and fodder production system of the Soviet period has reverted to more diversified, labor-intensive agriculture managed by single households. This has been heavily supported by foreign technical cooperation, with the aim of reducing dependency on food aid. As a consequence, self-sufficiency in crop production increased remarkably to about 70% (AKF 2002). Livestock production remained low despite the fact that traditional family summer pasturing systems were re-established. There are many obstacles to further improvement of agricultural productivity, however, including in particular limited irrigated plots, small livestock herds (in the Eastern Pamirs), a low potential for mechanization, decaying infrastructure, natural marginality, and lack of agricultural knowledge and experience.

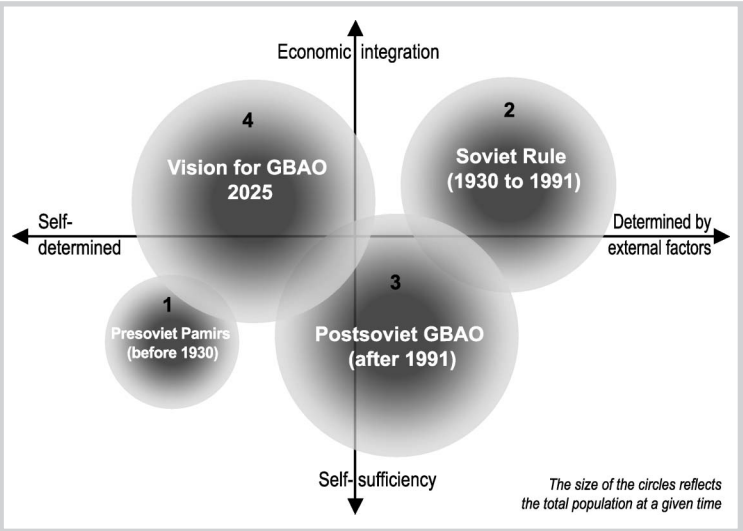


FIGURE 3 The Gorno Badakhshan Autonomous Oblast (GBAO) between self-determination and economic integration. (Draft by Hans Hurni, 2004)

The social dimension

Growing social inequalities and impoverishment are major characteristics of social development in GBAO. The privatization of livestock and land has compensated only in part for jobs lost after Independence. Thus despite remarkable efforts, many families are still unable to make a living based on subsistence agriculture (Mamadsaid 1997, and recent oral information from the Mountain Societies Development Support Programme). The most vulnerable and affected are households headed by single individuals or forced to support family members in need of such services as medical treatment. Hence premature harvests of potatoes and crops are fairly common for the poorest households. Even sound social networks at community level cannot provide the necessary compensation.

While growing social networks assure a fairly equitable distribution of aid within villages, great disparities exist nevertheless between the 400 villages and the few centers where most economic growth is taking place in GBAO. The transformation process hit women especially hard, as they were the first to lose their jobs. As a result, gender-based disparities have increased (Falkingham 2000), and the socio-political role of women has declined (Mamadsaid 1997). Retired persons are heavily affected, too. Owing to high inflation after Tajik Independence, pensions have become very small and are often paid only irregularly.

These hardships lead to considerable out-migration, particularly among younger persons with higher levels of education. This has a negative impact on the educational level of current and future generations. Because governmental salaries are far from sufficient to sustain a family, employees frequently either emigrate in search of better economic opportunities or engage in additional economic activities, thus neglecting their core duty and expertise. As a result, de-professionalization of public services, with particularly negative impacts on the quality of the health and education sectors, has been reported.

The ecological dimension

The sensitive ecosystem of the Pamirs already suffered during the period of the Soviet planned economy. Independence has aggravated the situation in many domains. Today the situation is particularly serious for wildlife, cultivated land, pastures, and fuelwood resources. In the Eastern Pamirs, protected wildlife

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species such as the Marco Polo sheep, the snow leopard, and the Siberian ibex have been greatly reduced in numbers over the past 50 years. Extreme poverty in the 1990s forced the local population to hunt wild animals for meat. Legal and illegal hunting for skins and trophies increased pressure on wildlife. The profits seldom reached local community members (Haslinger 2004).

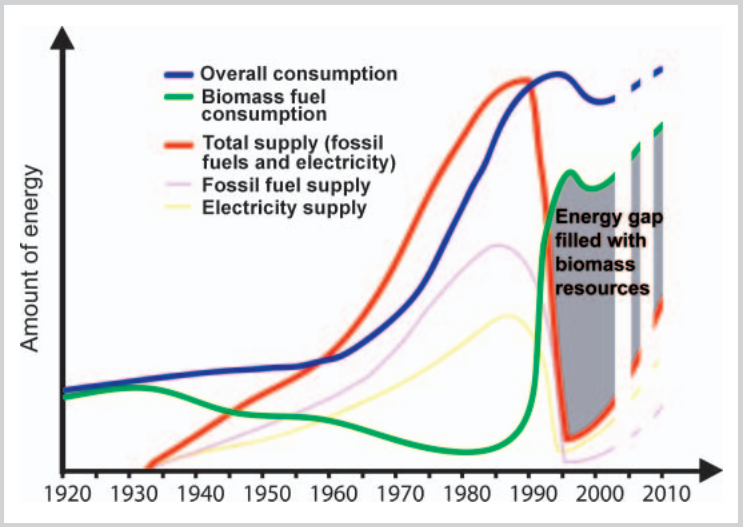
Due to the cessation of subsidized supplies of coal and diesel, woody biomass and dried dung became major sources of energy for cooking and heating (Figure 4), and are quickly being depleted (Droux and Hoeck 2004). The widespread clear-cutting of slow-growing dwarf shrubs such as *Artemisia* spp. and *teresken* (*Ceratoides* spp.) has serious negative impacts on soil, vegetation cover and wildlife. The same is true for the overgrazed pastures nearby. Winter pastures are particularly affected, since animals are no longer exported before winter. Now they must survive on very scarce local fodder resources, since imports are not affordable for most households.

There is no sustainable resource management in the valleys of the Western Pamirs. While productivity per land unit increased and the total land area under irrigation expanded to some extent, soil quality declined in most locations due to poor land management. Soil erosion due to failures in irrigation management is widespread. This is sometimes intensified by erratic rainfall, snowmelt, or torrential runoff. Soil nutrient cycles, particularly nitrogen fixation and humus production, need more careful management in order to avoid nutrient mining.

Assets

Non-sustainable processes appear to be widespread in GBAO. However, in order to improve the situation, existing assets and potentials must be considered and tapped more efficiently. These include well-established (family) networks among Ismaili, Kyrgyz and Tajik communities, the high educational standard, the traditionally strong role of women, and the still above-average infrastructure. Among the greatest ecological assets are water resources that can be used for both energy production and irrigation. Additionally, the high biological diversity of the Tajik Pamirs offers the potential to attract tourism, allow selective and controlled hunting, and gain international support for conservation and protection (Aknazarov et al 2002). Other opportunities include hot springs and mining of minerals and gemstones; these extractions should be carefully planned. If the recently much more relaxed geopolitical situation persists, opening of the borders to China and Afghanistan could provide important economic opportunities through market integration and technology exchange, thus serving as a major trigger for development.

FIGURE 4 Energy supply and demand, and shift of major energy sources since 1920. (Source: Droux and Hoeck 2004)



Transdisciplinary results: negotiating a regional development strategy

The aims of the first part of the strategy workshop were to identify current problems, find ways to overcome them, and clarify who should take action. The objectives of the second thematic work session were to compile assets and opportunities, identify potential beneficiaries, and discuss why such potentials have not been tapped so far.

Assessing problems and opportunities

In summary, the major problems seen in the 6 thematic workgroups were closely related to decaying public infrastructure, insufficient energy supply, and the lack of technical equipment. Secondarily, poor economic performance, widespread poverty, and considerable deficiencies in legislation and state administration were named. Most groups mentioned a crosscutting issue—the need for specific and updated knowledge in different spheres—and bemoaned the absence of adequate scientific work. It is interesting to note that environmental problems such as land degradation were only perceived as a major problem by representatives of the agricultural sector.

Opportunities for sustainable development in the Tajik Pamirs were grouped in broad categories. Intensified land use, employing technical equipment and biotechnology, and complemented by niche products for export such as medicinal herbs, was named for the agricultural sector. A major asset was also seen in existing infrastructure and old Soviet production units, whose maintenance should be ensured by private sector investments. Natural resources (eg water, mining, wildlife) and the exceptional mountain landscape of the Pamirs (tourism) are widely regarded as advantages

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of location with a potential to diversify and strengthen the economy. Contrary to the external view, the high level of education among Pamiris is not regarded as a major asset or opportunity.

In general, problems and opportunities mentioned were largely related or reduced to technical aspects, infrastructure, governance, legislation, and knowledge. The call for technical equipment and maintenance, and expansion of the extended infrastructure system, probably reflects a preference for technical solutions still influenced by the earlier period of heavy Soviet investments in this region. By contrast, the call for improved governance, a better legal framework, and more relevant knowledge reflects the changing needs of a society in rapid transformation. Accordingly, demands for modern management methods, more transparency, and better accountability are clearly on the rise, even if they are rarely voiced openly. The demand for temporary and solution-oriented knowledge and research is surely justified, but scientific work, as requested, is still heavily oriented towards dominant disciplinary and basic research, as it was in the Soviet era, rather than towards a more holistic type of research.

BOX 1 Summarized outcome of the sessions in which the 5 stakeholder groups developed their vision of sustainable development in GBAO.

Common vision of a sustainable GBAO

In the year 2025, GBAO will be a developed region in Tajikistan, self-sustaining on the basis of mostly internal resources and integration in regional markets. The government and administration will function according to international standards, applying principles of human rights, democracy, subsidiarity, and global ethics. Civil society will be based on a multi-party system and diversity of opinion; decisions will be based on polls and referendums. The population will be stable at approximately the current level (220,000). The economy will be market-based with the 3 sectors accounting for roughly one third each. Thus the agricultural sector will produce two-thirds cash crops per farm, as well as livestock in the high pastures. The secondary sector will be dominated by small enterprises as well as by extraction of minerals and generation of hydroelectricity. Tertiary sector activities will consist of health care, education and administration, as well as tourism, which will benefit from relaxed regulations and improved infrastructure. With regard to the ecological dimension, natural resources will be protected against degradation by multiple measures aiming at sustainable use of wildlife and vegetation resources, effective management of water resources, and soil and water conservation within the context of irrigation management. In external relations, GBAO will benefit from a free-trade zone policy, and foreign financial flows will consist of 75% investment and only 25% humanitarian aid.
Source: Khorog Workshop results, 2002

Formulating a vision

As a guide for subsequent elaboration of the strategic elements, the 5 stakeholder groups were asked to present their idealistic view of sustainable development for GBAO by the year 2025. The different visions provided an insight into how the groups thought that society would be organized, what the economic structure would look like, and how the environment might develop. The authors have attempted to amalgamate the 5 visions into a common vision (Box 1).

From an analytical standpoint, a comparison of the weights assigned to the respective visions is as interesting as the visions per se, and can provide important hints about promising entry points, and particularly about diverging opinions which could severely impede efforts towards sustainable development. It is interesting to note that all stakeholder levels asked emphatically for the democratization of political life in GBAO and for a broadly based democratization process. Less surprisingly, the same applied to the call for general economic growth, though the mentioning of paths to be taken clearly revealed differences between the different stakeholder groups.

The characteristics of the different visions can be summarized as follows:

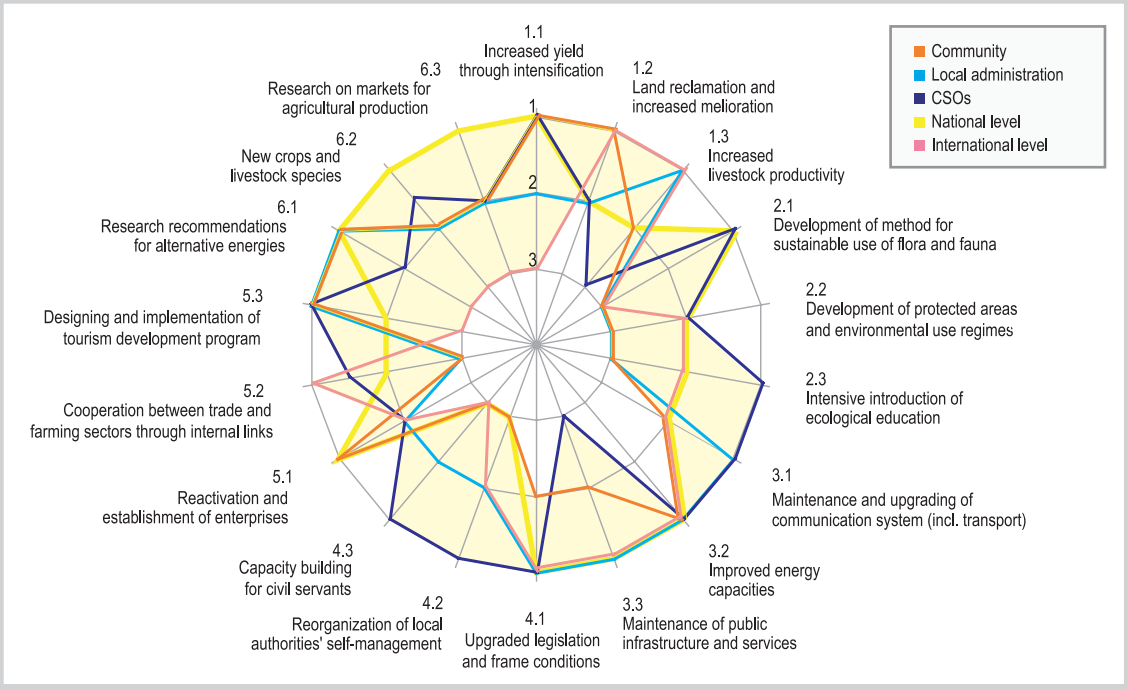
- The pragmatic vision at the local level clearly sees agriculture and local natural resources as the backbone of the economy in 2025, with a strengthening of grassroots democracy in village organizations.
- The GBAO administration emphasized self-sufficiency based on a market economy, regional integration, and improvements in agro-pastoralism. This level would welcome a typical referendum-style democracy, with referendums and polls installed by 2025.
- The vision of the national administration is primarily geared towards industrial economical development coupled with population increase, along with general democratization of the political sphere.
- The visions of civil society organizations (CSOs) and the international level clearly reflect their current development activities. Both put emphasis on local self-government, subsidiarity, and ecological issues. One difference between these two stakeholder levels is that the international level saw a decrease in external aid, whereas the CSOs did not address their role in 2025 at all.

Determining priorities

To determine development priorities, each group named the 3 most important strategic objectives and

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FIGURE 5 Appraisal by 5 different stakeholder groups of 3 main objectives in each strategic sector (1 = high importance, 2 = medium importance, 3 = low importance). (Adapted from Breu and Hurni 2003)



the anticipated outcome for a time horizon to the year 2010 (Figure 5). In the subsequent final parallel session, the stakeholder groups were asked to appraise sectoral objectives in terms of importance and urgency. The top objectives in terms of importance and urgency were:

1. Maintain energy facilities and increase energy production (3.2);
2. Reform/upgrade legislation and create favorable conditions (4.1); and
3. Reanimate existing enterprises and create new ones on the basis of domestic natural resources (5.1).

While energy and infrastructure were given the highest priority, industry, trade, tourism, and agriculture received average ratings, and research and biodiversity conservation were ranked as least important and urgent. This outcome reflects the very tense economic situation prevailing in the Tajik Pamirs. The most pressing issues need to be tackled in a short- to medium-term time frame, while all the rest must wait. It is therefore not surprising that ecological issues and potentially long-lasting research projects, the results of which are uncertain in terms of their implications for concrete action, were considered as least urgent and important.

On the other hand, 4 objectives with higher-than-average ratings showed great divergences between stakeholder appraisals. The strategic objectives of intensification of agriculture (1.1), maintenance of public infrastructure services (3.3), elaboration/implementation of a tourism program (5.3), and research on alternative energy sources and production (6.1) would thus probably require further negotiation among the stakeholder groups.

A brief analysis of the appraisals by stakeholder groups (Figure 5) reveals that on average, the CSOs assigned the greatest importance and urgency to the 18 objectives. Scores by the national and GBAO administrations were in the middle, whereas local and international representatives gave the lowest ratings. This might be explained either by gradually differing perceptions of the state of the economic and ecological systems of GBAO depending on the stakeholder group, or by the fact that stakeholder groups did not deem all sectoral objectives suitable for contributing to sustainable development. The most affected local level was more interested in production-oriented objectives such as agriculture, energy, infrastructure, industry, and tourism, while governance aspects such as institutional development, as well as research and particularly biodiversity and wildlife conservation received low ratings. This may mean that these aspects were not considered relevant to immediate livelihood improvement. It probably also reflects a general mistrust in the administration and little confidence in state agencies concerned with nature protection. The low ratings for research objectives can probably be explained by the fact that research priorities so far were mainly set in Dushanbe and did not contribute sufficiently to improving livelihoods in this remote area.

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Conclusions

While the baseline assessments carried out provided the necessary foundation for knowledge, the strategy workshop offered an innovative platform for exchanging ideas, opinions and visions, and thus helped generate action-oriented knowledge in a transdisciplinary approach. Given its participatory nature, involving stakeholders from all levels, the workshop facilitated one of the very first broadly based strategy development processes carried out in a transition country so far. The methodology applied proved to be appropriate for initiating broad reflection and negotiation among various stakeholder groups, leading to joint identification of possible measures to be taken. Knowledge—and its enhancement through active involvement of all stakeholder levels in intensive dialogue—appeared to be an effective vehicle for innovation and changes of attitude, containing a potential to effectively contribute to sustainable development in marginalized and resource-poor mountain areas.

The fact that the GBAO administration translated and published the results of the Strategy Workshop and then initiated follow-up meetings in different districts to seek options for further development and operationalization of the strategic objectives shows the readiness for a turn-around. However, this promising fundamental change of attitude and behavior requires support from outside the region. It is thus understandable that the local government is currently trying to raise external funds to prepare a mountain support law allowing implementation of proposed measures such as those elaborated during the workshop.

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