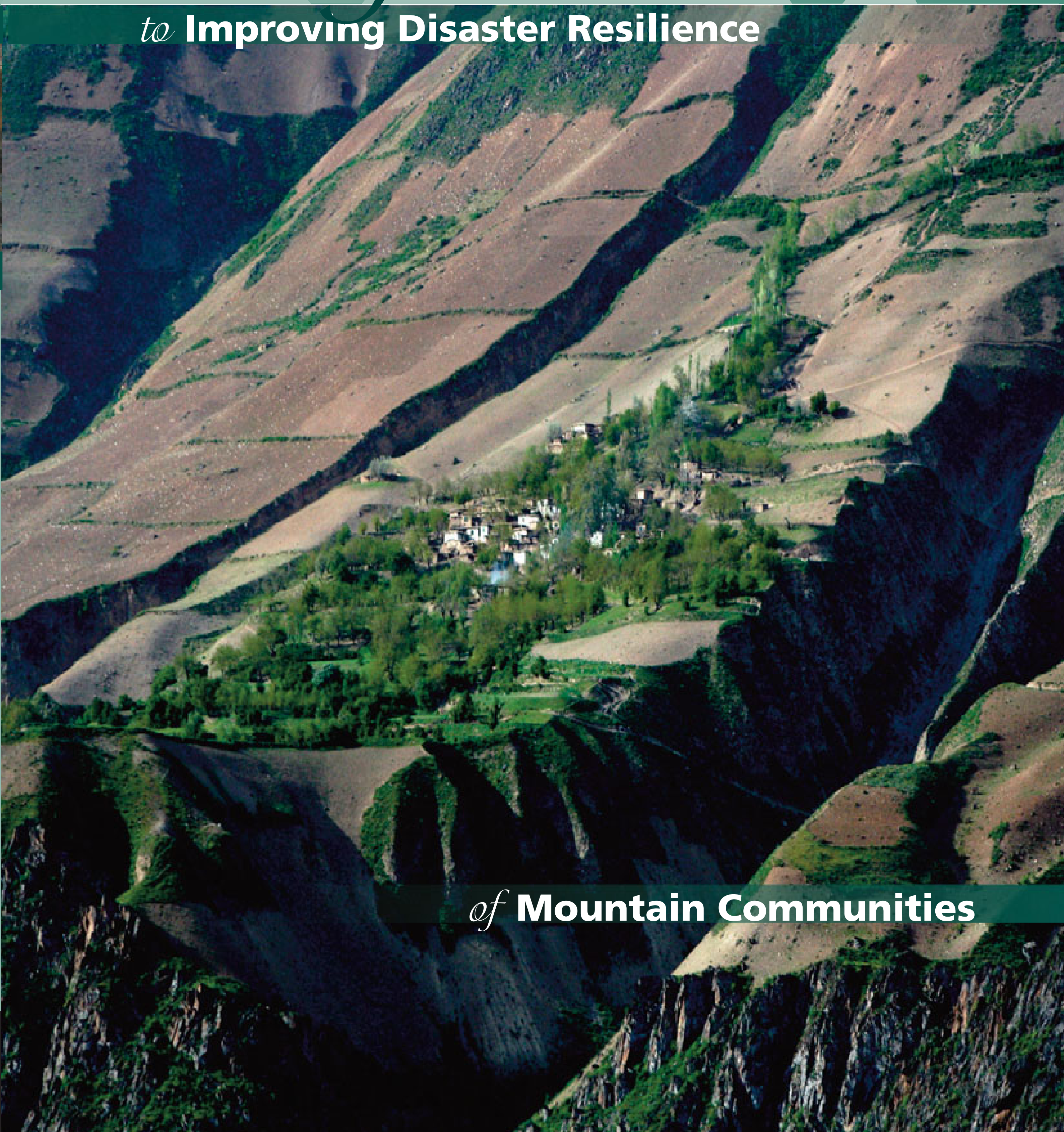
A Guide
to Improving Disaster Resilience
of Mountain Communities



A Guide to Improving Disaster Resilience of Mountain Communities

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EUROPEAN COMMISSION

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FOCUS HUMANITARIAN ASSISTANCE

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Preface

From the days before Alexander the Great passed through the region 2,000 years ago, the inhabitants of the Gorno-Badakhshan region of Tajikistan have faced a constant threat of disasters, including floods, landslides, earthquakes and severe winter weather.

The valleys of Gorno-Badakhshan are at the crossroads of Central Asia. Over the centuries, the relative isolation of the mountainous communities has meant that a high degree of indigenous resilience has been required for survival and prosperity.

The ability of the population to successfully face disasters was further tested over a decade ago during the social and economic upheaval in the aftermath of the civil conflict following the independence of Tajikistan in 1991.

This ***Guide*** documents a community disaster risk management process developed by Focus Humanitarian Assistance (FOCUS) with the people of Gorno-Badakhshan to re-establish and expand community and individual capacities to plan for, respond to and recover from disasters. The process described in the ***Guide*** has had a demonstrable impact in improving local resilience to disasters. In particular, the process has lead to a clear empowerment of communities to take concrete steps to reduce the likelihood or severity of disasters in the region.

Focus Humanitarian Assistance, an affiliate of the Aga Khan Development Network, has been working in Gorno-Badakhshan for over ten years. Early efforts dealt primarily with humanitarian relief. Since 2001, we have shifted our efforts to assist communities to improve their disaster resilience. These efforts have been supported by the European Commission Humanitarian Aid Department through DIPECHO (disaster preparedness) projects, and with support from the Governments of Tajikistan, USA, Japan, Switzerland and France and by the World Bank and the United Nations.

FOCUS recognizes that a number of community disaster risk reduction methodologies and procedures exist. We believe the Gorno-Badakhshan process has a number of features which can be of benefit when incorporated into disaster risk reduction efforts in other mountainous areas. These features include:

- A process incorporating a strong involvement of communities.
- The creation of alliances between communities and government authorities in early-warning, disaster response and mitigation.
- Empowerment of communities to take locally manageable actions to reduce or avoid the impact of disasters.
- Establishing a viable communication system which supports early-warning, response and a general reduction of community isolation.
- The use of advanced technologies, including remote sensing and geographic information systems, to more accurately identify the extent and potential severity of hazards within a community.
- An integration of community-generated and technologically-generated hazard information to both validate and educate the community about potential hazards and risks.

FOCUS plans to continue work with the residents of Gorno-Badakhshan to further reduce disaster risks, improve preparedness and build resilience. We expect these efforts will expand and improve the procedures set out in this ***Guide***.

We recognize that others who use this ***Guide*** will identify opportunities for improvements and modifications. We hope that these experiences will be shared among those who are working to reduce disaster risk in mountain areas so that we can move towards the overall goal of improving the lives and well-being of mountain peoples worldwide.

Focus Humanitarian Assistance is a registered charity in Afghanistan, Europe (headquartered in the United Kingdom), Canada, India, Pakistan and the USA. FOCUS USA serves as the primary implementer of disaster risk and humanitarian relief programs in Tajikistan.

Hadi Husani
Executive Officer
Focus Humanitarian Assistance USA

Foreword

Focus Humanitarian Assistance (FOCUS) has been working to reduce the impact of disasters on the residents of the Gorno-Badakhshan Autonomous Oblast (GBAO) of eastern Tajikistan since 1997. Initially, efforts focused on providing relief to disaster victims.

As FOCUS gained experience, it recognized that community-driven disaster risk reduction was a key to sustainable development and reduction of the impact of disasters. Starting in 2001, FOCUS began shifting efforts to build the capacities of mountain communities in GBAO to understand and manage the disaster risks which they face on a constant basis.

Before *The village of Dasht was located on an outwash plain in the Shokhdara river at the confluence of a smaller stream from the high mountains to the southwest.*

After *On the night of August 6, 2002, a flood descended down the stream into the village, totally destroying the village, leaving 24 persons dead and 55 households displaced.*

The geophysical and social assessment process, community disaster risk planning, mitigation and early-warning activities and communications systems described in this ***Guide*** *are intended to prevent similar disasters in the future.*

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Since 2003, the disaster risk management effort has been supported by four European Commission's Humanitarian Aid Department Disaster Preparedness (DIPECHO) projects. With this support, FOCUS has developed, tested and improved a process by which mountain communities in GBAO can assess disaster risks and develop and implement plans to manage these risks over the short and long term.

The GBAO disaster risk management process is based on a combination of quantitative and qualitative data drawn from physical sciences and a strong involvement of communities in the assessment and risk management process. The risk management process developed in GBAO also links communities to each other and the government through a sharing of information and capacities as well as physical communications systems. These public-private-community partnerships are critical to the sustainability of risk management efforts.

Given the progress made in increasing mountain community disaster risk management capacities in GBAO, FOCUS and the Aga Khan Development Network, through the Fostering Disaster Resilient Communities in Isolated Mountain Areas Project, have documented the GBAO disaster risk management approach for use in other mountain regions. The documentation process has resulted in *A Guide to Improving Disaster Resilience of Mountain Communities* and an accompanying CD containing samples of forms, spreadsheets and programs used in GBAO.

The ***Guide*** was initially assembled during work at the FOCUS office in Khorog, GBAO. This work included consultations with FOCUS staff and participating communities and authorities, as well as a review of project documents and procedures.

A draft Guide was reviewed by FOCUS Staff in the GBAO and Washington. The finilized Guide was released by FOCUS in 2008.

Fundamental Concepts

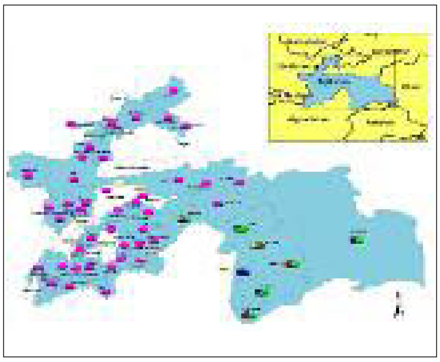
Four fundamental concepts underlie the community disaster risk management activities set out in this *Guide*. The first is that mountain communities can be **empowered to reduce the risk from and vulnerability to the natural hazards they face through better and more accurate information.** Mountain communities are intimately aware of the hazards which threaten where they live and work.

However, operational research and analysis provide communities with a broader-based understanding of the hazard threats and opportunities which need to be considered in making their communities safer and more sustainable. The emphasis on research and analysis, particularly the use of geographic information systems and related spatial analysis tools, integrates local knowledge about risks and hazards available in mountain communities into overall disaster risk reduction efforts.

The second concept is that communities can **reduce the risk from and vulnerability to natural hazards and improve their resilience to disasters** through locally managed and often small-scale mitigation activities. In many cases, these activities involve structural risk reduction, such as the installation of an embankment to limit flooding. However, vulnerabilities are also reduced through education, awareness raising, capacity building and planning. These non-structural methods are often as important over the long term as structural mitigation.

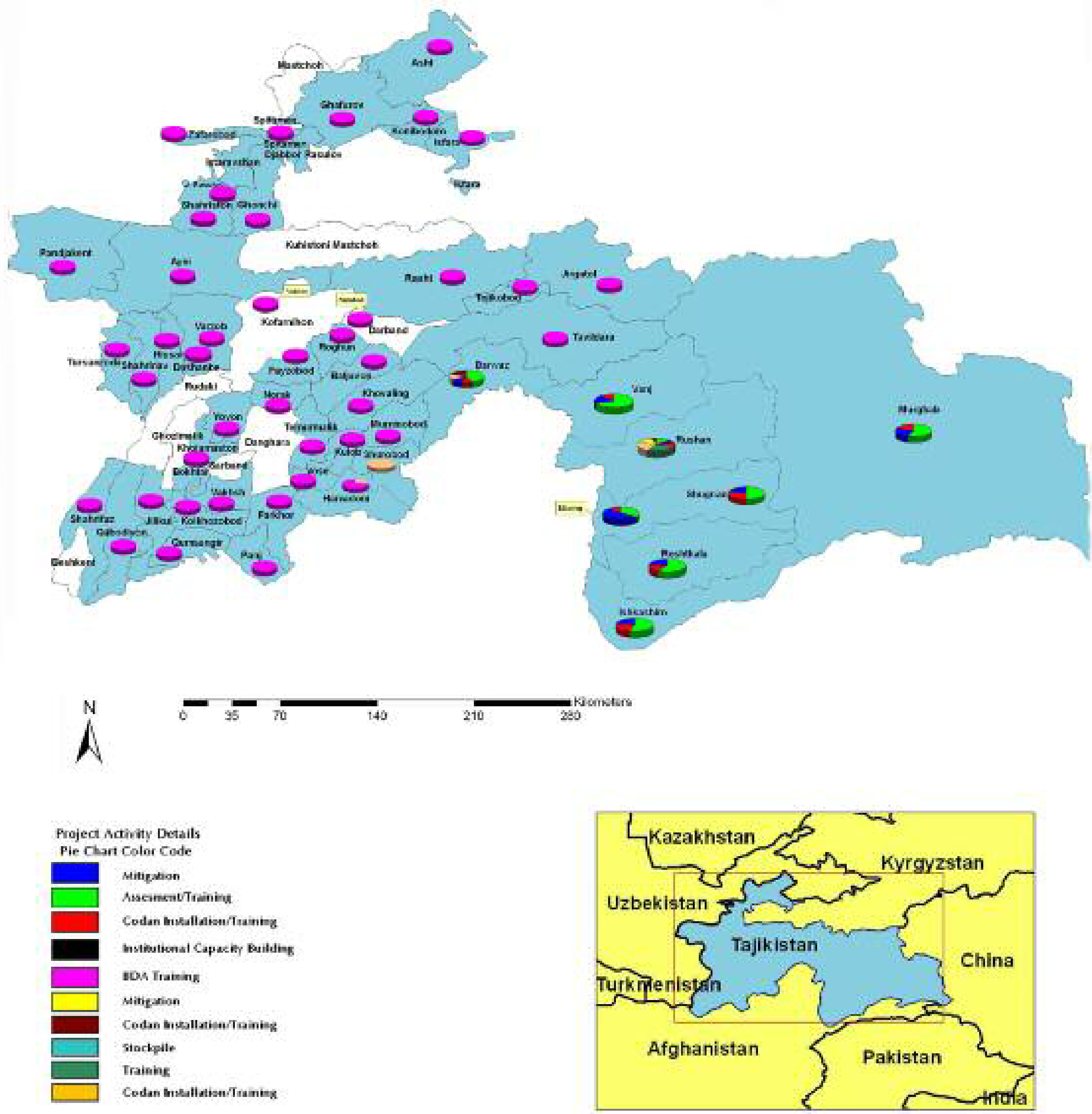
Third, **reducing risk and vulnerability and increasing resilience is a cooperative process.** Where communities bring knowledge of local conditions and a willingness to work on mitigation activities, non-governmental organizations (NGOs) provide technical skills and access to information and resources. In addition, government, in the form of science-based research agencies or organizations which deal with various aspects of disaster reduction or response, also has an essential role to play in supporting community disaster management efforts. This public-private-community partnership is essential for sustainable risk reduction.

Finally, a comprehensive assessment of hazard risk and vulnerabilities **allows communities to not only address immediate threats but look forward to reducing less pressing threats**, as well as considering how a community can grow while minimizing future disasters. A forward looking consideration of hazards, risk and vulnerability is particularly important in mountain areas, where the space available for inhabitation is limited and growth in population and wealth can increase the risk of disasters. Information about current hazards, risks and vulnerability and an increased capacity to deal with current and future disasters, will enable these communities to better reduce disaster impacts in the future.



See map of FOCUS activities in Tajikistan on next page.

Map of FOCUS Activities in Tajikistan



Introduction

Mountain Areas, Hazards and Disasters

Mountain areas are characterized by peaks above 2,000 meters, deep valleys and limited areas for human habitation. Weather in mountain areas is often severe, with heavy snow fall and severe cold. Growing seasons are short. Seasonally high flows of water in streams and rivers often lead to flooding or other hazard events.

The environment *The envronment is understood as the physical, chemical and biological surroundings in which disaster-affected and local communities live and develop their livelihoods. It provides the natural resources that sustain individuals, and determines the quality of the surroundings in which they live.*

– The Sphere Project www.sphereproject.org

What is a hazard?

A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

– from The International Strategy for Disaster Reduction www.unisdr.org/eng/library/libterminologyeng%20home.htm

Environmental conditions are considered to be fragile in mountain areas, but they are also highly variable. In particular, micro-climates and the availability of water from snow-fed streams can render locations relatively well suited to support human exploitation for food production, small-scale industry and other livelihoods activities.

To successfully and sustainably prosper in mountain areas, inhabitants must:

1) Intensively exploit accessible land for agriculture, pasture and other productive purposes.
2) Pursue a diverse livelihood strategy, including farming, herding, trade, labor and migration, to ensure the failure of one or several of the means of livelihood does not threaten individual well-being or life.

Mountain areas are hazardous places. Typical hazards include:

- Flooding from snow melt, seasonal rainfall and glacial lakes
- Landslides
- Debris flows
- Rock falls
- Mud flows
- High levels of ground water
- Avalanches
- Severe winter storms and cold weather
- Earthquakes

All the hazards listed above exist outside mountain areas. However, they are more spatially intense for those individuals exploiting the small areas of arable land which are the focus of human occupation in mountain areas.

In many cases, the limited amount of arable land means that mountain inhabitants cannot avoid living in or adjacent to hazard affected areas. In addition, human actions can accentuate hazards. For instance, poorly maintained irrigation canals can lead to mud flows which pose a threat to buildings in a community.

Three factors contribute to making disasters in mountain areas likely to be more severe than elsewhere:

1) Human and physical resources are highly concentrated. This places a greater part of these resources at risk to loss from a single disaster event.
2) Mountain communities have limited local resources with which to respond to a disaster.
3) The isolated nature of mountain communities makes providing external relief and recovery assistance difficult. This problem is significantly greater in winter, where extreme weather can cut a community off from outside assistance for days or longer.

What is a disaster?

A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources.

A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk.

– *from www.unisdr.org/eng/library/lib-terminology-eng%20home.htm*

Limiting the impact of disasters can be realized by:

1) Reducing the threat posed by hazards. This is accomplished through non-structural and structural measures, such as designating evacuation routes or establishing communications systems (non-structural measures) or building protection walls (a structural measure).
2) Increasing local capacities to respond to disasters when they occur. This is achieved through:
   - Pre-disaster planning
   - Assigning post-disaster responsibilities to specific individuals and training them for these responsibilities
   - Stockpiling critical resources

For mountain communities, addressing the hazards and disaster threats which they face can be more complex and pose more significant challenges than in other locations. At the same time, addressing these hazard and disaster complexities is critical if mountain communities are to prosper. This in turn makes disaster risk management a core ingredient of a sustainable and prosperous future for mountain communities.

This *Guide* contributes to safer and more resilient mountain communities by providing a means for these communities to identify, assess and address the range of potential disasters that they face on a constant basis.

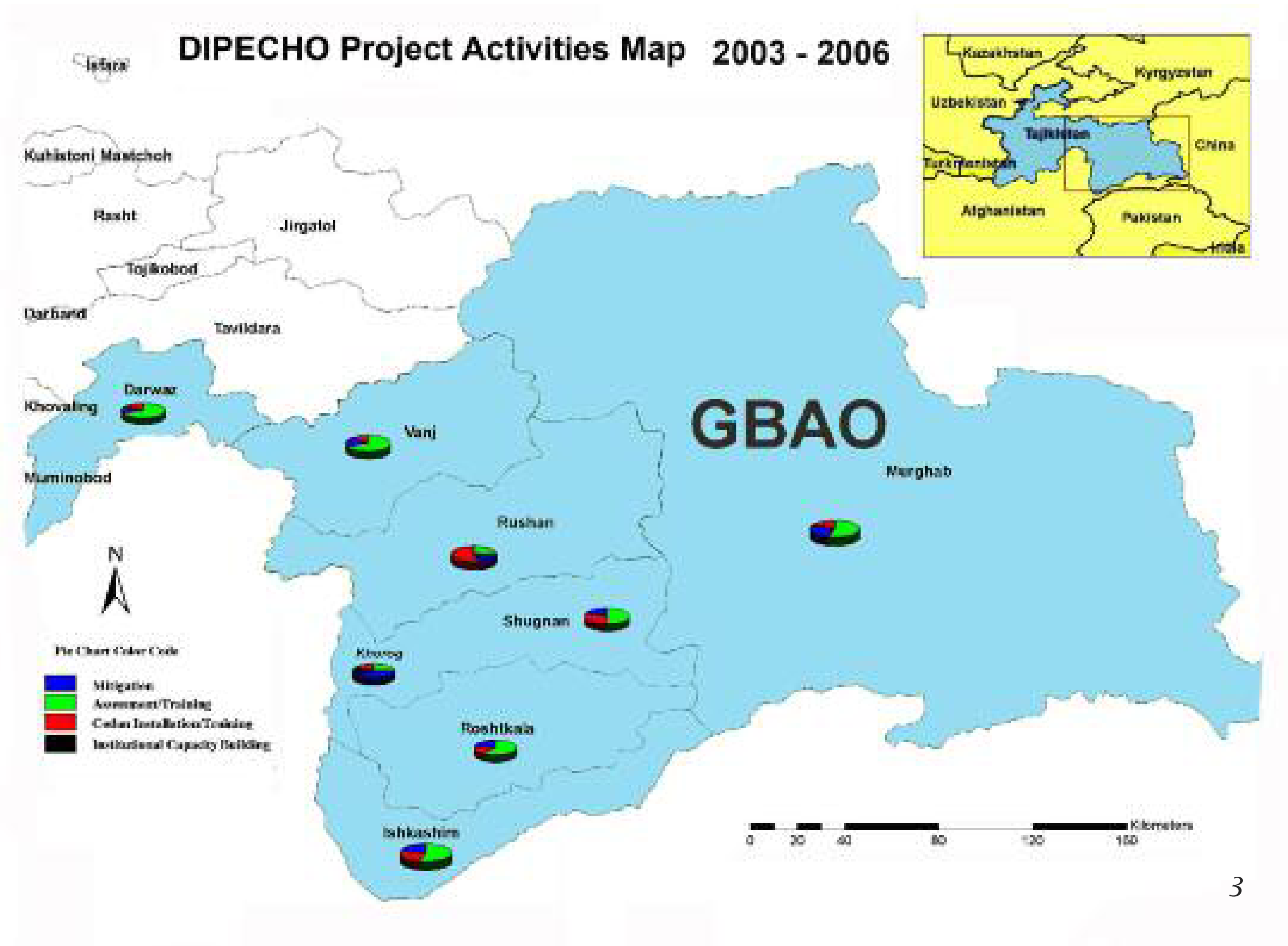
The FOCUS Experience

FOCUS has been working in the Gorno-Badakhshan Autonomous Oblast (GBAO) of eastern Tajikistan since 1997. FOCUS is an affiliate of the Aga Khan Development Network (AKDN) with a mandate on disaster relief and preparedness activities. Since 2003, FOCUS has been working on a number of disaster preparedness projects in GBAO.

The primary focus of these projects has been to increase the ability of communities in the mountainous areas of GBAO to prepare for and respond to disasters. By 2006, FOCUS-led disaster management activities have been undertaken in over 200 of approximately 430 communities in GBAO. Further information on FOCUS activities in Tajikistan is available at www.akdn.org/focus.

FOCUS disaster-related activities in GBAO

- *Emergency food, nutrition and health care in the GBAO, 2000 to 2004*
- *Lake Sarez Risk Mitigation Project*
- *Japan Social Development Fund: Reducing poverty in high mountainous environment around Lake Sarez.*
- *DIPECHO I, II, III and IV: Fostering Disaster Resilient Communities in Isolated Mountain Areas*
- *Central Asia Region Earthquake Safety Initiative (CARESI)*
- *FOCUS Disaster Response Team*



Resource Requirements

Details on the personnel and equipment needed for the GBAO Community Disaster Preparedness process are provided in *Annex A, Staffing,* and *Annex B, Equipment Requirements*. (Annexes can be found in a CD accompanying the ***Guide***.) The community assessment process normally requires a team of five persons, comprising of two geologists, a community mobilizer, a GIS specialist and an engineer. Additional staff are involved in the risk analysis process and GIS mapping tasks. In addition to working on the assessment team, the engineer works with each village on mitigation activities.

The equipment required for the technical aspects of the assessment process include global positioning satellite receivers (GPS), computers capable of running geographic information system (GIS) programs, appropriate data storage devices and color printers and plotters. The use of laptop computers and GPS enables field teams to develop preliminary maps and documents for use in consultations with communities during the field portion of the risk assessment process. A standard list of equipment is provided in Annex B.

Intended Users

This ***Guide*** is intended primarily for non-governmental organizations engaged in community level disaster risk management activities in mountain areas. The ***Guide*** can be used by government authorities in assisting communities to reduce the risk of, and improve resilience to, disasters. The ***Guide*** and associated sample tools can be also used to teach the community disaster risk management process developed in GBAO to NGO and government staff and communities in other mountainous areas.

A *Guide*, Not a Fixed Process

It should be emphasized that this document is a guide to community risk assessment and management in mountain communities. The procedures in this ***Guide*** and the samples of tools and forms provided in the accompanying CD represent the current best practice in GBAO. It is likely that these procedures and tools can be improved with further use.

Users should feel free to modify, adjust or revise the material in the ***Guide*** and forms on the CD to fit their specific needs and localities. FOCUS would appreciate learning of experiences using this ***Guide***, as well as receiving copies of new procedures or programs which are developed based on the materials in the ***Guide***. Comments on the ***Guide*** and revisions or updates to the documents contained in the CD should be sent to *focususa@focushumanitarian.org*.

Adaptations

The disaster risk management process described in the ***Guide*** was developed based on the environmental conditions, social and economic systems, governance structure, built environment (roads, bridges, buildings and communication and electrical systems) and information databases of the GBAO region. These conditions are not identical in other mountain areas. As a result, it may be necessary to adapt the procedures in the ***Guide*** to fit local conditions.

Specific technical adaptations which may be required are noted in the descriptions of disaster risk management procedures in the text. Broadly, adaptation of the procedures necessitates consideration of the following five questions:

1) What is the social context in the area where the Guide will be applied?

The GBAO has a relatively open social system, where individuals from outside a community can interact relatively freely with community members. In different social systems data collection methods need to be adjusted to correspond to the class, gender and economic circumstances of the communities to be assessed. The social context of a community will specifically affect the Social Vulnerability Assessment, Village Disaster Management Plan, development of community communication systems and the selection of mitigation projects.

2) What social and economic data are available?

In GBAO, the risk management process benefits from an extensive database on social and economic conditions which was developed before the independence of Tajikistan and updated through the project. If a wide and well established database on social and economic conditions is not available, then alternative ways to create these databases need to be developed. Although this may seem daunting, the immediate solution rests in a greater reliance on qualitative data collection and analysis. A number of vulnerability assessment tools have been developed for data poor environments and can be adapted for use with the procedures set out in the *Guide*.

3) What quantitative data on geophysical processes is available?

As with social and economic data, the GBAO process uses quantitative data on geophysical processes, such as flooding or debris flows, in the risk mapping and assessment process. A lack of detailed geophysical data can be addressed through three linked avenues of effort:

- The collection of oral histories of geophysical events in a community and the mapping of these events using hand drawn maps and GPS
- The use of remote sensing to identify potential hazard events
- Reference to hazard research in geophysically similar areas to identify possible hazards and hazard impacts

4) Are appropriate maps available?

Base maps of relatively good accuracy exist for GBAO. The GBAO process relies heavily on these maps for assessments and to present disaster risk management information. A lack of good (accurate) maps can be addressed through the collection of additional GPS data to create real maps of risk and impact areas within a community.

This process is the same as the GPS data collection process used in GBAO, where the coordinates of all the infrastructure (roads, buildings, etc.) and hazard impact areas (such as the limits of flood area or debris flow) are collected using a GPS and then mapped on a base map. At the same time, the GPS data can be mapped without a base map, with the same results in terms of accuracy and representation of infrastructure and hazard areas in a community. However, the absence of a base map will require additional work, as the number of GPS data points need to be greater so that the resulting maps cover a larger area in adequate detail.

5) ***Are there an adequate number of specialists to conduct the geophysical assessments?***

Collection and analysis of geophysical data is usually managed by a team of geological, hydrological and avalanche specialists. A sufficient number of specialists may not be available. If this is the case, options to consider include:

- Having the available specialists provide training to non-specialists in the specific hazards and assessment methods needed for the target communities
- Developing quick reference guides (e.g. pictures of different types of rock falls) for use by non-specialists to aid in field data collection
- Having specially trained non-specialists collect data according to a standardized data collection protocol,and having this data analyzed by a specialist based in a central location
- Having specialists scout a community and develop a data collection plan to be implemented by non-specialists
- Using university students who are studying geophysical topics to assist specialists and provide support to non-specialists in field data collection

The lack of geophysical specialists will also likely increase the time needed to conduct a community level assessment and the analysis of the resulting data. This need for additional time should be incorporated into seasonal and annual assessment plans.

Organization of the *Guide*

The remainder of the *Guide* is divided into four core sections:

Strengthening Community Disaster Risk Management Capacities
Includes a presentation of the Conceptual Approach and Disaster Risk Management Process Overview

Risk Identification
Includes elements on *Background Data, Hazards Catalog* and *Community Disaster Risk Management Baseline Survey*

Risk Knowledge Generation
Includes elements on *Risk Analysis, Hazard Impact Assessment, Social Vulnerability Assessment* and *Mapping Assessment Results*

Risk Knowledge Dissemination
Includes elements on *Rebuilding Interventions, Community Disaster Mitigation Activities* and *Capacity Building* in which *Village Disaster Management Plans, Training* and *Strengthening Community Level Communications* are addressed.

Additional sections cover ***Collaboration with the Government, Technical Notes & Maps*** and ***References***.

The CD which accompanies the ***Guide*** contains annexes which include samples of working documents used in the assessment and mitigation activities developed by FOCUS. These annexes are as follows:

Annex A	Staffing
Annex B	Equipment Requirements
Annex C	Disaster Risk Management Baseline Survey form
Annex D	Hazard Impact Assessment forms
Annex E	Property Value form
Annex F	Guidelines for Conducting Community-based Workshops
Annex G	Village Disaster Management Plan
Annex H	*Hazard Impact Assessment* spreadsheet
Annex I	Social Vulnerability Index Data Collection Form
Annex J	Checklist of Deliverables
Annex K	Standard Mapping Symbols
Annex L	Community Mitigation Activity Request form and Proposal Outline
Annex M	Community Mitigation Workshop Plan
Annex N	Draft Community Agreement
Annex O	Mitigation Project Activity Report
Annex P	Project Handover Sheet
Annex Q	Project Data Sheet
Annex R	Workshop for Community Disaster Management Planning
Annex S	Training Plan for Radio Users
Annex T	District and State level Workshop Plans

These annexes are referenced where appropriate in the ***Guide***.

Strengthening Community Disaster Risk Management Capacities

Conceptual Approach

The objective of disaster risk management is to increase the resilience of communities to disasters. The *Risk Management Strategic Approach* developed by AKDN and applied by FOCUS in GBAO is divided into three stages:

Risk Identification The collection and analysis of data and information on hazards, disasters, vulnerabilities and risks in a community.

Risk Knowledge Generation Transforming data and analysis performed into practical information which can be used by communities to reduce vulnerabilities and risk. For example, this practical information could include scenario planning or village prioritization for interventions.

Risk Knowledge Dissemination The use of the knowledge generated through the analysis process to reduce the risk, vulnerabilities and impact of disasters. This process works in parallel with a range of efforts including:

- Pre-disaster risk mitigation
- Community and institutional capacity building
- Effective disaster response
- Post-disaster rebuilding
- Risk reduction in development activities

Efforts at each stage are influenced by ***cross-cutting principles,*** including development and measurement, knowledge sharing, replicability, gender mainstreaming, sustainability measures, partnerships and community ownership.

As community resilience improves, the impact on hazards, vulnerabilities and risks is continually assessed. This feedback is used to

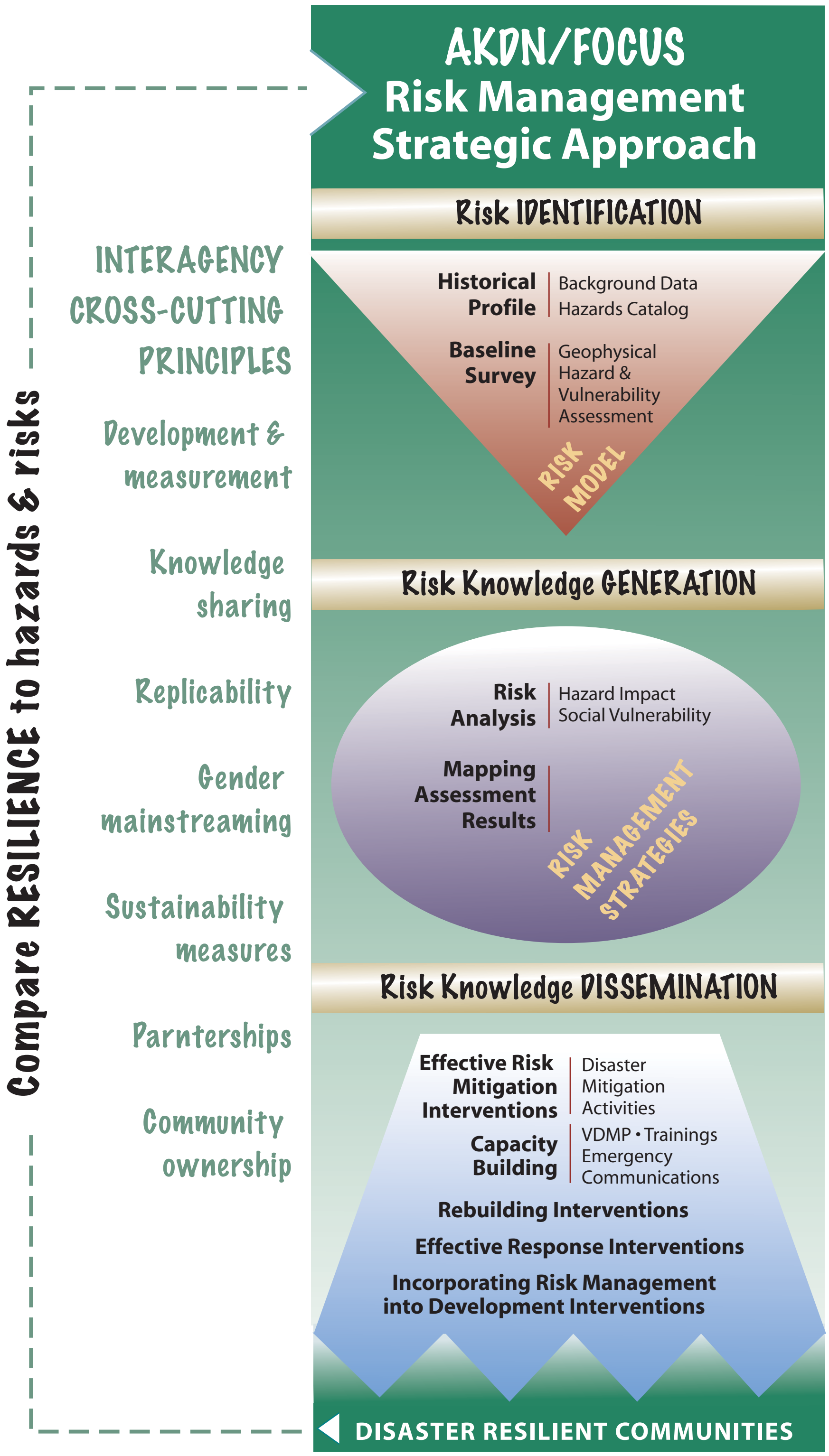
- Identify adjustments to disaster risk management activities
- Initiate new activities addressing new or longer-term risks

The practical result of this conceptual approach is a continual process of assessing and adjusting to disaster risks using a variety of pre- and post disaster interventions which take into consideration a number of key cross-cutting issues.

The activities described in the following sections focus on pre-disaster capacity building and mitigation and improved post-disaster response.

At the same time, the development value of the knowledge generated in the disaster risk management process should also be included in the implementation of the *Strategic Approach.*

It should be noted that there is no specific point from which to start the application of the ***Strategic Approach***. In some communities, a large part of the information needed for the *Risk Information* element of the strategy may already be available. Under these circumstances, work under the *Strategic Approach* can begin with the activities under *Risk Knowledge Generation.*



In other locations, activities might start at *Risk Knowledge Dissemination,* such as for developmental interventions which can benefit from risk knowledge generated from disaster recovery programs. In some circumstances, the *Strategic Approach* may have more than one entry point and the use of multiple entry points will facilitate progress towards disaster resilient communities.

In any case, the selection of a single or multiple entry points should be based on a good understanding of the circumstances which contribute to the disaster risks faced by a community. This understanding is critical to ensuring the right entry points are selected and the focus of disaster risk management efforts corresponds to the hazards, capacities and awareness of the communities and individuals involved in the disaster risk reduction efforts.

Disaster Risk Management Process

The disaster risk management process used in GBAO is based on a community-based effort which combines:

- Qualitative community assessment methods and
- A wealth of hard science data on hazards collected at the community level.

This combination of qualitative and quantitative information is not often used in community disaster risk management efforts.

The disaster risk management process is accomplished by:

- Collecting background information on hazards and target communities
- Doing a comprehensive assessment of vulnerabilities and risks facing individual communities
- Identifying how a community can respond to and mitigate the identified risks
- Designating and implementing community-driven structural and non-structural preparedness and mitigation activities

A key element of this process is the presentation of quantitative and qualitative data in the form of maps and tables. This risk knowledge generation is key to enabling communities to decide how to prepare for or mitigate the disaster risks facing the community.

The assessment process results in a ***Village Disaster Management Plan***. The plan is a community-owned document which:

- Sets out the risk assessment results
- Identifies how households can respond before, during and after possible disasters
- Sets out evacuation and other disaster-specific response plans
- Designates post-disaster responsibilities for specific community members or groups of community members
- Identifies pre-disaster mitigation activities, ranging from improved communications to the construction of protective walls, which can be implemented by the community to reduce risks.

Mitigation activities are implemented as a follow-up to the assessment process, and are considered as an integral part of the disaster risk management process. Government authorities are closely involved as partners in the disaster risk management process. These authorities include those responsible for

- Local and regional government
- Emergency management
- Research and specialized institutions (e.g. local offices of the hydro-metrological institute)

The direct involvement of government authorities in the risk management process provides

- Additional support to communities beyond local and project resources
- Creates a basis for continued risk reduction activities after the end of external support

The process involves a combination of:

Desk-top research

Data collection in disaster-threatened communities

Qualitative and quantitative analysis

Discussions with community members

The production of maps covering community infrastructure, hazards and risks

Completing a community level disaster risk management assessment and producing a ***Village Disaster Management Plan*** requires a total of 16 working days, with:

- 3 days devoted to preparation
- 5 days devoted to field work
- 7 days to risk analysis and mapping
- 1 day to present the results to the community and development of the ***Village Disaster Management Plan***

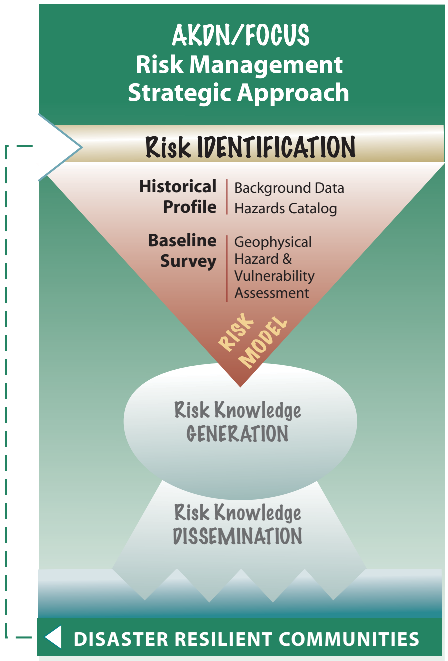
Annex A, *Staffing*, sets out the responsibilities and qualifications of staff involved in improving community disaster management capacities.

The disaster risk management process developed in GBAO is designed for mountain areas. The process is most applicable to other mountain areas of Central and South Asia. The GBAO process is also generally applicable in mountain areas elsewhere in the world.

The GBAO process can be applied to non-mountain areas. However, changes to certain aspects of the process would be needed to reflect the differences in geography, land use and population densities.

Limited resources or time may not allow the inclusion of all communities in a region in the disaster risk management effort. Options for selecting communities for inclusion in risk management efforts are provided in *Community Selection*, to be found in the *Technical Notes & Maps* section at the end of this ***Guide***.

Risk Identification



A wide number of factors influence the impact of a hazard on a community, as well as the resilience to disaster. Without knowing the background, or *Historical Profile*, of communities where disaster risk management efforts will take place, it is difficult to identify hazard impacts and how these can be managed by the community. Collecting background data is the first of two steps in developing the historical profile in the *Risk Identification* segment of the *Risk Management Strategic Approach*.

Background Data

The disaster risk management process begins with collecting and organizing background data on a community. This data will be used:

- To develop the hazard profile (the next step)
- To select communities to be included in the risk management process
- In hazard and vulnerability assessments
- In the development of the ***Village Disaster Management Plan***
- In the selection of mitigation activities

Data sets needed for the disaster risk management process are described in the *Data Sources and Formats for Disaster Risk Manage-ment Assessments,* to be found in the *Technical Notes & Maps* section on page 45. The table covers the:

- Types of data needed
- Likely source of the data
- How the data should be formatted for optimal use

Data should be in a form which can be used by a geographic information system (GIS). A GIS is a valuable tool in the risk management process. Not only does it provide a way to manage data but a GIS is extremely useful in the analysis and production of maps and tables to be used by communities in decisions about how to deal with disaster threats.

Geographic Information Systems (GIS) *Computer programmes for capturing, storing, checking, integrating, analysing and displaying data about the earth that is spatially referenced." GIS is a key tool in organizing, understanding and using the baseline and other data collected for community disaster risk management.*

– From The International Strategy for Disaster Reduction www.unisdr.org/eng/library/lib-terminology-eng%20home.htm

It may be necessary to re-enter data in electronic form (for instance, in Excel® spread sheets) to ensure it can be used in a GIS. Hard copy maps need to be digitized (i.e. copied into a digital format) so that they can be used in the GIS. When digitizing maps it is necessary to ensure their geographic coordinates match those for other data in the GIS.

Given the link between data collection and use of a GIS for risk management process, staff involved in developing and maintaining GIS should coordinate the overall data management process. In many cases, considerable diligence will be needed to collect the variety of data and information which is needed in an assessment.

A GIS file structure used for the community disaster risk assessment can be found on page 27. This structure provides a framework for collecting and storing background data. All electronic data collected should be "backed up"—kept in two copies—on a regular basis to avoid losing hard-to-collect data through mechanical failure, fire or other disaster.

A set of physical files should also be established to organize written documents and maps which are collected. These physical files should be organized according to the same structure used for electronic files.

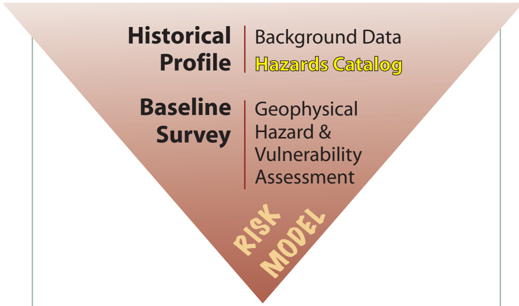
Hazards Catalog

A hazards catalog addresses each hazard identified in the catalog and provides information on

- Location
- Nature
- Severity
- Early-warning
- Mitigation activities

Information assembled in the catalog can be used to

- Guide during field research into hazards in a community
- Educate community members on the hazards that they face
- Guide in the selection of early-warning and immediate response actions for the *Village Disaster Management Plan*
- Help determine the priority and extent of mitigation activities



*To complete an accurate risk assessment, a detailed understanding of the hazards facing a community is needed. Developing a hazards catalog completes the **Historical Profile** task of the **Risk Identification** segment of the **Risk Management Strategic Approach.***

Historical Data on Impact and Frequency of Disasters *FOCUS needed accurate data on the impact and frequency of disasters in GBAO on which to base their risk assessments. In collecting background data, FOCUS worked with the GBAO Committee of Emergency Situations and Civil Defense (CoESCD) to review 15 years of data on disasters and develop estimates. The information collected was used by FOCUS and also contributed to setting up a disaster database and reporting system at the GBAO CoESCD. The same information can be used in developing a hazards catalog.*

Information for the catalog can be acquired from these sources:

- National and local emergency management agency offices
- Universities, including schools of geology and earth sciences
- Government organizations, NGOs and advocacy organizations
- The United Nations Disaster Management Training Program *www.undmtp.org/modules_e.htm*
- International Strategy for Disaster Reduction library on disaster risk reduction *www.unisdr.org/eng/library/lib-select-literature.htm*
- Asian Disaster Preparedness Center *www.adpc.net/IRC06*

.

A sample **Hazard Catalog Information Sheet** is provided on the right. Each catalog sheet should cover a different hazard in the region where the risk management process will be undertaken. If several variations of one hazard are present, such as landslides, debris flows and mud slides, each should be covered on a separate catalog sheet. Note that the information sheets can be provided to communities, schools and local government as part of capacity building efforts.

Adapted from *An Overview of Disaster Management*, 2nd Edition, Disaster Management Training Programme, 1992, http://landslides.usgs.gov

Hazard Catalog Information Sheet — Landslides

General characteristics

Landslides vary in types of movement (falls, slides, topples, lateral spread, flows), and may be secondary effects of heavy storms, earthquakes and volcanic eruptions. Landslides are more widespread than any other geological event.

Causal phenomena

Down slope transport of soil and rock resulting from naturally occurring vibrations (incl. earthquakes), changes in direct water content (e.g., increased rainfall or seepage from irrigation canals), removal of lateral support, loading with weight, weathering or human manipulation of water courses and slope composition.

Predictability

Frequency of occurrence, extent and consequences of landslides may be estimated and areas of high risk determined by use of information on area geology, geomorphology, hydrology, climatology and vegetation.

Factors contributing to vulnerability

Settlements built on steep slopes, softer soils, cliff tops, at the base of steep slopes or on mouths of streams from mountain valleys. Roads, communication lines in mountain areas. Buildings with weak foundations. Buried pipelines or weak pipes. Lack of understanding of landslide hazard.

Typical adverse effects

Physical damage – Anything on top of or in path of landslide will suffer damage. Rubble may block roads, lines of communication or waterways. Indirect effects can include loss of productivity of agricultural or forest lands, flooding, reduced property values.

Casualties – Fatalities have occurred due to slope failure.

Risk reduction measures

Hazard mapping. Legislation and land use regulation. Insurance.

Specific preparedness measures

Community education. Monitoring, warning and evacuation systems.

Typical post-disaster needs

Search and rescue (use of earth removal equipment); medical assistance; emergency shelter for homeless.

Area affected

For a region — this section should refer to known locations of the hazard. A map of these sites can be included with the *Catalog*.

For a community — this section should refer to the locations mapped during the community disaster preparedness assessment, and include maps of where the hazard occurs in a community.

Community Disaster Risk Management Baseline Survey

The *Community Disaster Risk Management Baseline Survey* has two major components:

1) The collection of data on the social and economic situation of a community, using *participative rapid assessment* methods
2) The mapping and collection of data on hazard-threatened areas and the physical infrastructure within a community.

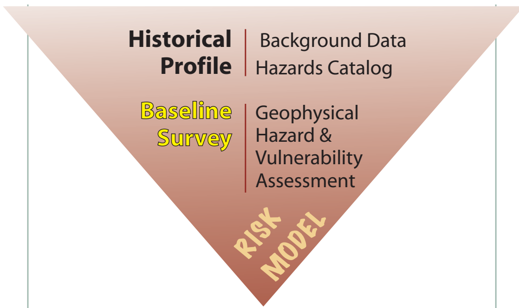
The community is formally briefed on the results of the *Baseline Survey*. Based on this information, the community develops a draft *Village Disaster Management Plan*. (The plan is more fully elaborated by the community following risk analysis and mapping, as described later.)

The *Baseline Survey* is normally conducted over a period of five days and involves the following personnel:

- Chief geologist
- Deputy geologist
- Community mobilizer
- Engineer, specializing in public works construction
- GIS field officer

Additional specialists should be included as needed. For instance, where severe avalanches are a threat, the team should include an avalanche specialist.

The community is involved in all aspects of the survey process. The assessment field work ends with a community meeting in which the assessment results are discussed and a draft *Village Disaster Management Plan* is presented and discussed.



The Community Disaster Risk Management Baseline Survey collects qualitative and quantitative information about hazards and community capacities. Baseline Survey results provide a large part of the information used in the ***Geophysical, Hazard*** *and* ***Vulnerability*** *assessments of the* ***Risk Identification*** *segment of the* ***Risk Management Strategic Approach.***

Baseline Survey Forms

Work to complete a community baseline is structured around a number of forms which guide and facilitate the collection of information in a community. These forms and the procedures for completing them are described below.

The first component of the *Baseline Survey* process involves using the ***Disaster Risk Management Baseline Survey*** form to collect data on:

- The social and economic aspects of the community. This information is collected by the community mobilizer through interviews with community members and local officials using participatory rapid assessment methods.
- The hazards and awareness of potential disasters in the community. The community mobilizer collects this information from individuals and in group meetings that involve community members in:
  - Drawing maps of hazardous areas in their community
  - Identifying possible evacuation routes from dangerous locations to safe havens
  - Identifying how information on hazards and activities following disasters is shared.
- The location of all key infrastructure, including roads, buildings and electrical and water supply systems.

Participatory Rapid Assessment (PRA)

Participative Rapid Assessment is a key method to involve villagers in the baseline assessment. A PRA can ensure that villagers' views, opinions, knowledge and perceptions are an integral part of the assessment process. Information on PRA concepts and practice can be found at

Rapid Assessment Procedures — Qualitative Methodologies for Planning and Evaluation of Health Related Programmes

www.unu.edu/Unupress/food2/UIN08E/uin08e00.htm#Contents

The World Bank Participation Sourcebook, Appendix I, Methods and Tools, Participatory Rural Appraisal

www.worldbank.org/wbi/sourcebook/sba1.htm.

This work is usually done by the GIS field officer using a Global Positioning System (GPS) receiver. The location of each road, building and other infrastructure is logged into the GPS for later use in creating maps of the community. The nature of a building and construction materials are also noted when the GPS coordinates are collected. In many cases, a digital photo is also taken at the same time a point is recorded on the GPS. These photos are useful for reports and discussing hazards, potential impacts and mitigation options with the community and authorities.

A sample of the ***Disaster Risk Management Baseline Survey*** form can be found in Annex C. Note that most of the questions in the form have a set of pre-determined answers. These answers need to be reviewed before use to ensure they correspond to local conditions.

The second component of the *Baseline Survey* focuses on the hazards and their impacts in the community. This hazard-focused data collection is accomplished by completing:

- A mapping of the hazard impact area. This mapping is accomplished using one or more GPS receivers, with the geologists using field survey procedures to define source and impact areas.
- A ***Hazard Characterization*** form, completed for each hazard in a community. The form collects a range of information on conditions which relate to the extent and scope of the impact of the hazard. The form also provides for different possible hazard impact scenarios, as described in more detail on the left.
- A ***Historic Profile of Hazard Site*** form for each hazard impact area in a community. This form creates a location-specific record of damage caused by past hazard events. This information is useful in determining risk mitigation activities, as well as identifying which priority these activities should be given.
- An ***At-Risk Elements Inventory*** form for each hazard location, which identifies the number of specific physical assets which might be damaged under each hazard scenario set out in the Hazard Characterization form and the monetary value of this damage.

  To ensure standard economic values are assigned to physical infrastructure covered by the inventory, a table of values should be established at the start of the assessment. An example of a values table can be found in Annex E.
- An ***At-Risk Elements Vulnerability Assessment*** form which summarizes the level of damage which might occur to physical assets due to different hazard scenarios and rates these damages on a scale from 1 (less than 5%) to 5 (over 70%). This rating is based on the:
  - Scale of the hazard impact. Scale includes the area covered by the hazard and the depth of this coverage, for instance, the depth of water in a flood.
  - Intensity of the hazard impact. Intensity includes the speed of onset of the hazard event.
  - Physical strength of the asset which might be impacted. Physical strength refers to the innate ability of an asset to resist the impact of the hazard. A building constructed of reinforced concrete would have greater physical strength to resist flooding than a building of earth bricks located in the same place.

Hazard analysis

Identification, studies and monitoring of any hazard to determine its potential, origin, characteristics and behavior.

– *From* ***The International Strategy for Disaster Reduction***
www.unisdr.org/eng/library/lib-terminology-eng%20home.htm

Assessing multiple impacts from a single hazard

Disastrous events arising from one type of hazard can occur at different frequencies and affect areas of different size. For instance, some floods are small and frequent and cause little damage, while others are large but less frequent and result in a disaster.

When a hazard is expected to occur at different frequencies or impact different areas, these differences need to be described separately in the hazard assessment process.

This is accomplished by first mapping the full possible extent of a hazard impact. This is identified as "Scenario 1".

Data on the hazard is then used to develop a second, less severe, scenario ("Scenario 2"). The development of progressively less severe scenarios continues until all likely hazard impacts/frequency combinations are covered. In most cases, this does not require more than four scenarios.

Community members should be involved in developing each scenario. In fact, community members can be very helpful in defining the frequency and impacts used in developing each scenario.

- The documentation of past and possible present preparedness, mitigation and prevention measures for the hazards identified in the field assessment.
- A form identifying ***Early Warning and Monitoring Systems*** for each of the hazards identified in the Hazard Characterization forms.
- A ***Quantitative Assessment*** form which summarizes the information set out for each hazard scenario in the forms summarized above, as well as specifying the:
  - The size of the vulnerable population at each hazard site
  - How long the average person spends in the hazard zone (discussed in more detail in the section on *Risk Knowledge Generation*.)
  - Total monetary damage expected

  This information is used in the risk analysis process, described in the following section.

Samples of these forms can be found in Annex D. The forms should be reviewed before use to ensure they correspond to local conditions. The forms can be amended to include hazards which are not covered in the standard set of sample forms found in Annex D.

Field work to complete the hazard-related forms is led by the chief geologist and involves the deputy geologist and the GIS field officer as well as community representatives. The engineer is involved in this field work with the objective of making an early identification of possible mitigation activities as well as providing advice to other team members on the physical impacts of hazards.

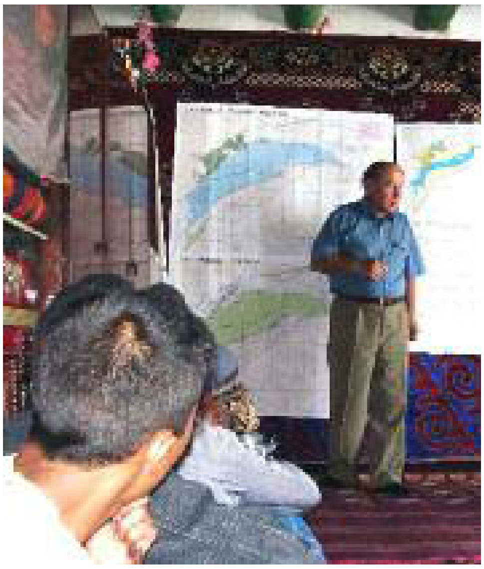
Community Field Assessment Activities

The preceding section described the forms and procedures to be used in the *Community Disaster Risk Management Baseline Survey*. This section describes how survey work is conducted in the field. The assessment work in a village is divided into ten tasks, some of which will take place at the same time. These tasks are summarized on the next page, followed by a typical five-day community assessment schedule.

Community assessment preparations

Before a field team departs to a community to do an assessment they should:

- *Have maps and working sketches at appropriate scales of the village and any available data on infrastructure and hazard sites.*
- *Have printed and digital copies of the hazard catalog sheets and village data base information for use in completing the assessment forms and for discussions with the village.*
- *Ensure that the village is aware the team will be working in the village for a week and will be holding a number of meetings with village authorities, groups of individuals and with the village as a whole.*
- *Ensure that adequate logistics, lodging and work supplies will be available to the team.*
- *Ensure that all computers, printers, GPS and other equipment are in working order and adequate supplies (e.g., ink, paper, batteries) are available.*



Task One Discussions with village leaders on a possible community disaster management assessment, conducted by the community mobilizer. These discussions take place before the actual five days of assessment work in a community.

Task Two Meeting with village leaders and other authorities on the planning of the assessment. This meeting takes place on the first day of the assessment, conducted by the whole assessment team.

Task Three Formal and informal interviews led by the community mobilizer to collect data for the *Baseline Survey* form (See sample in Annex C). These interviews include:

- Village officials regarding official statistics and village demographics
- Elders regarding the history of disasters in the village
- Specific groups, such as women or residents of areas frequently affected by disasters

Task Four Community mapping, to identify the location of hazard areas, critical infrastructure and possible safe sites, from the community perspective, led by the community mobilizer.

Task Five Collection of position (GPS) data for the village boundaries and critical infrastructure, as well as digital photos of the infrastructure, led by the GIS field officer.

Task Six Identification and mapping of village and hazard zones, using sketch maps and GPS data. The resulting maps will include:

- Watershed boundaries (1:50,000)
- Surface geology/geomorphic map (1:10,000)
- Village boundary, land use and critical infrastructure (1:10,000)
- Hazard site and impact zones (1:10,000)
- Safe haven and evacuation routes (1:10,000)

Some of this information can be combined on fewer than four maps if the resulting maps do not become confused with information. The mapping process involves the GIS field officer, geologists and engineer.

Task Seven Completing hazard-specific worksheets/forms including:

- *Hazard Characterization*
- *Historic Profile of Hazard Site*
- *At-Risk Elements*
- *At-Risk Elements Vulnerability Assessment*
- Documentation of past and possible preparedness, mitigation and prevention measures
- *Early-Warning and Monitoring Systems*
- *Quantitative Assessment*

Sample forms are located in Annex D. They are completed by the geologists with the assistance of the GIS field officer and engineer as well as with input from community representatives based on field work in the community.

Task Eight Identification and assessment of possible mitigation activities based on input from the geologists, community mobilizer and community members. The work on identifying and documenting possible mitigation activities goes hand-in-hand with the hazards field work by the geologists. This step is led by the engineer and involves visits with community members to discuss possible mitigation activity sites and the practicalities of these activities.

Task Nine Briefing the village on the preliminary results of the assessment through presentations and working groups. This provides an opportunity for discussion between village members on the hazards faced by the village and how to mitigate them. The briefing covers the evacuation routes and possible safe havens identified by the team, as well as any early-warning procedures the village should institute.

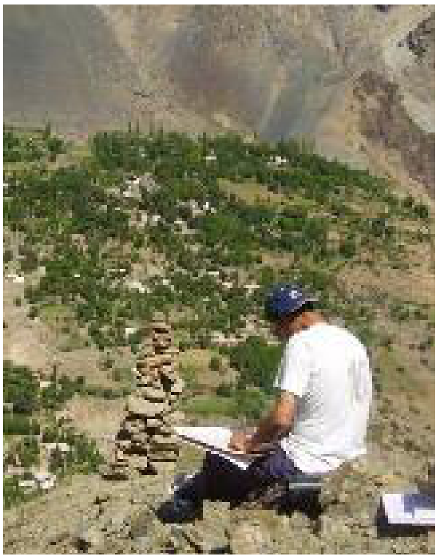
The *Guidelines for Conducting Community-based Workshops (*Annex F) provides goals, objectives, organizational suggestions and detailed session summaries for briefing a community at the end of the assessment process. The briefing is conducted by the whole Assessment Team who assist the community in developing their own *Village Disaster Management Plan.*

Task Ten Transferring the field data to the GIS and Risk Analysis teams. Before this takes place, each team member reviews the data they collected to ensure it is accurate to limit potential problems in the transfer process. The data transfer process involves all Assessment Team members working with the team of GIS specialists and staff involved in the Risk Analysis process, as described in the following section.

Mitigation should not wait

Opportunities to mitigate hazards should not wait. Discussions on mitigation options should be a constant process during assessment field work, as well as being integrated into the final village meeting.

Early-warning and evacuation are often the most immediate and practical mitigation measures available to a village. For this reason, the assessment maps, potential evacuation routes and safe havens in each village are discussed with the village members before the end of the assessment field work.



Day One

GIS Field Officer

1) Attend introduction meeting with village decision makers
2) Assist the community mobilizer (CM) in performing community mapping exercise
3) Assist the CM in completing sections of the Baseline Survey

Senior Geologist

1) Arrange an introductory meeting with village decision makers
2) Assist the CM with the community mapping exercise
3) Conduct appropriate sections of the Baseline Survey

Junior Geologist

1) Attend introductory meeting with village decision makers
2) Perform community mapping exercise
3) Conduct appropriate sections of the Baseline Survey

Community Mobilizer

1) Attend introductory meeting with village decision makers
2) Perform community mapping exercise
3) Conduct appropriate sections of the Baseline Survey

Engineer

1) Attend introductory meeting with village decision makers
2) Conduct appropriate sections of the Baseline Survey
3) Participate in community mapping

Day Two

GIS Field Officer

1) Take photos of critical facilities/infrastructure
2) Obtain location (GPS) and attribute data for critical facilities/infrastructure
3) Obtain location (GPS) and attribute data for village boundaries and land use
4)Enter Baseline data
5)Perform interim data entry and GPS download

Senior Geologist

1) Finalize reconnaissance survey
2) Complete geological mapping
3) Preliminary identification of hazards on maps

Junior Geologist

1) Finalize reconnaissance survey
2) Complete geological mapping
3) Take photos of geomorphology
4) Preliminary identification of hazards on maps

Community Mobilizer

1) Complete Baseline Survey
2) Enter data

Engineer

1) Finalize reconnaissance survey
2) Identification of mitigation measures/resources available

Day Three

GIS Field Officer

1) Obtain location (GPS) of households
2) Perform interim data entry and GPS download

Senior Geologist

1) Complete Hazard, Vulnerability Assessment maps and worksheets

Junior Geologist

1) Complete GPS worksheets for hazards
2) Take photos of hazards
3) Enter data

Community Mobilizer

1) Enter data.
2) Data analysis

Engineer

1) Design potential mitigation projects and develop budgets

Day Four

GIS Field Officer

1) Enter data
2) Perform interim data entry and GPS download

Senior Geologist

1) Complete Hazard, Vulnerability Assessment maps and worksheets
2) Prepare for community workshop

Junior Geologist

1) Complete GPS worksheet for hazards
2) Take photos of hazards
3) Prepare for community workshop

Community Mobilizer

1) Prepare for community workshop

Engineer

1) Complete design of potential mitigation projects and develop budgets.
2) Prepare for community workshop

Day Five

GIS Field Officer

1) Review of all data for the village
2) Complete all activities
3) Participate in community workshop

Senior Geologist

1) Review of all data for the village
2) Complete all activities
3) Participate in community workshop

Junior Geologist

1) Review of all data for the village
2) Complete all activities
3) Participate in community workshop

Community Mobilizer

1) Review of all data for the village
2) Complete all activities
3) Participate in community workshop

Engineer

1) Review of all data for the village
2) Complete all activities
3) Prepare for community workshop

Risk Knowledge Generation

Risk Analysis

Risk analysis is divided into two parts. The first, a ***Hazard Impact Assessment,*** considers the impact of physical hazards on human life and in terms of economic losses.

Hazard impact assessments are undertaken for each hazard area in a community and for each scenario developed for each hazard area. For instance, two landslide areas in a village are assessed separately, and each scenario is assessed for each landslide area. The assessment results for each hazard area are then compared to rank hazards from highest to lowest in terms of threat to a community.

Risk analysis

Risk analysis is the core element of the ***Risk Identification*** *segment of the* ***Risk Management Strategic Approach.*** *Risk analysis uses the data collected in the Community Disaster Risk Management Baseline Survey to complete the* ***Hazard*** *and* ***Vulnerability*** *assessments. The results of these assessments provide the knowledge used for* ***Risk Mapping*** *and the* ***Village Disaster Management Plan.***

Risk, vulnerability and risk analysis

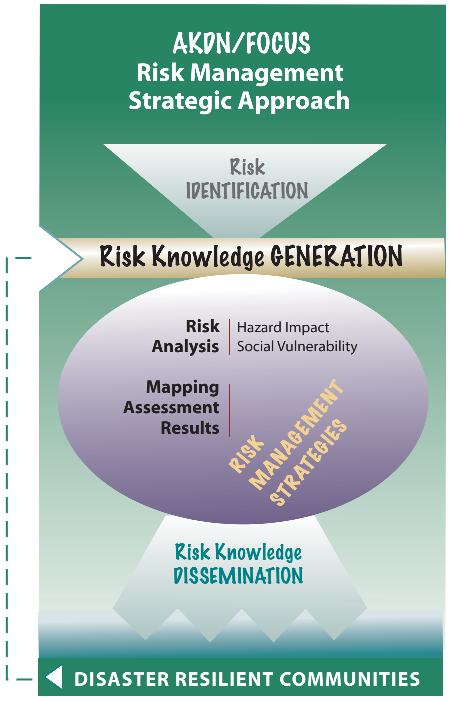
Risk *is the probability of harmful consequences or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions.*

Risk is conventionally expressed by the notation: Risk = Hazards x Vulnerability

Vulnerability *is the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards.*

Risk analysis *is a methodology to determine the nature and extent of risk by analyzing potential hazards and evaluating existing conditions of vulnerability that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend.*

– From ISDR www.unisdr.org/eng/library/lib-terminology-eng%20home.htm



The second part, the ***Social Vulnerability Assessment*** considers:

- The impact of all the hazards facing a village
- How well a village is prepared to respond to or mitigate these hazards

The *Social Vulnerability Assessment* is performed on a village level and provides an overall indication of how well a village can manage and respond to disasters.

The procedures for each of these assessments are described below. The results of these two risk assessments indicate:

- How a village can respond before, during and after a disaster
- What mitigation activities will reduce the threats from potential disasters

Once obtained, the results of the assessments are:

- Fed into the ***Village Disaster Management Plan*** (see sample in Annex G)
- Used to guide the selection and execution of mitigation activities.

Hazard Impact Assessment results can be used to compare the impact of hazards within a region. This comparison, prepared through a combination of data tables and maps, can identify the most severe hazard locations across a region. With this knowledge, authorities can allocate resources to address the most severe hazards.

Social Vulnerability Assessment results can be used to compare vulnerability between villages. This knowledge can be used to prioritize villages in terms of:

- Efforts to reduce overall vulnerability
- The allocation of resources for mitigation activities

The Risk Analysis process is led by the Risk Analyst, supported by GIS staff and field assessment team members. A sample job description for the Risk Analyst can be found in Annex A.

Hazard Impact Assessment

The ***Hazard Impact Assessment*** uses an Excel® spreadsheet to calculate:

- The number of persons potentially affected by a hazard
- The potential direct economic damage which could be experienced in each hazard-specific zone in a village for each scenario

A sample description of the data used in the spreadsheet can be found under ***Data Entry Description — Hazard Impact Assessment Spread Sheet*** in the ***Technical Notes & Maps*** section. A ready-to-complete *Hazard Impact Assessment* spreadsheet is in Annex H on the CD.

Hazard Impact Assessment Table – Debris Flow

Location: Hazabad   Hazard Type: Debris Flow
Site ID: 2   Scenario: 1   Severity Factor: 1

Intensity rank	Area affected (Ha)	Frequency (event per year)	Physical at-risk elements	Number of at-risk elements	Structural vulnerability score	Number of persons exposed	Vulnerable persons exposed	Occupancy factor	Monetary value of physical elements at risk	Vulnerable persons at risk of being affected	Total persons at risk of being affected	Economic damage (expressed in monetary terms)	Economic damaged per hectare
3	13.7	0.042	Home	86	0.2	456	306	0.33	25000	4.2	6.3	18060	1318
3	13.7	0.042	Clinic	2	0.4	52	22	0.17	3000	0.2	0.4	101	7
3	13.7	0.042	Civic Center	1	0.4	33	17	0.17	10000	0.1	0.2	168	12
3	13.7	0.042	Store	1	0.4	54	37	0.14	30000	0.2	0.3	504	37
3	13.7	0.042	Mosque	1	0.4	51	20	0.18	35000	0.2	0.4	588	43
3	13.7	0.042	Road (km)	5	0.4				60000			5040	1008
3	13.7	0.042	Power Line (km)	6	0.2				2500			126	21
3	13.7	0.042	Well	3	0.2				3000			76	6
3	13.7	0.042	Transformer	2	0.4				5000			168	12
	TOTAL									**4.9**	**7.6**	**24830**	**2464**

When all the data for a specific hazard scenario has been entered into the *Hazard Impact Assessment* spreadsheet, the *Total Persons at Risk of Being Affected* and *Economic Damage* line items are totaled, as in the *Hazard Impact Assessment* spreadsheet. These totals indicate the expected potential human and economic impact of the hazard being assessed. (This calculation is done automatically on the *Hazard Impact Assessment* spreadsheet, as in the example above.)

The *Hazard Impact Assessment* spreadsheet can also be formulated to present other data on hazard impact. For instance, the *Hazard Impact Assessment* table shown here also presents *Vulnerable persons at risk of being affected* and *Economic damage per hectare*. This information is commonly used in hazard assessments.

When *Hazard Impact Assessment* spreadsheets are completed for all hazards in a village there is a need to compare the relative threat posed by these hazards. This is done by comparing the potential number of persons affected and the potential economic damage for each hazard scenario.

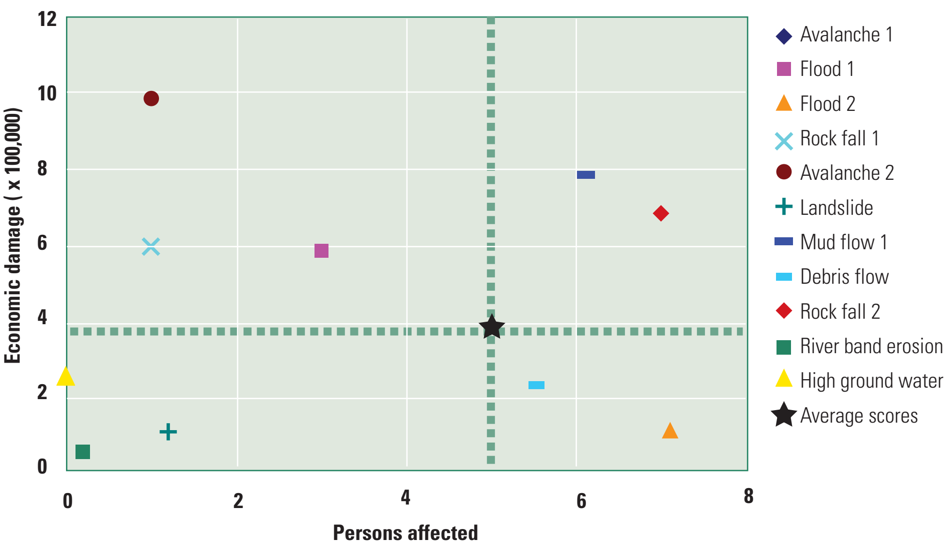
Bi-variant (two factor) analysis is an easily applicable tool in hazard impact assessment. This example can be most easily demonstrated on a ***scatter chart***. A scatter chart plots the common point between two data, in this case with one axis indicating the number of persons affected and the other the level of economic damage.

To create a scatter chart, the data for persons affected and economic loss for each hazard are entered into three parallel columns (hazard name, persons affected, economic loss) in a spreadsheet. The values for persons affected and economic loss are plotted in a table using the spreadsheet's chart function.

In the chart example below, the "y" axis represents economic damage and the "x" axis the number of persons affected. Labels describing the hazard being plotted are provided for each point where lines from the persons affected and economic loss on the vertical (x) and horizontal (y) axis meet.

An average value for *all persons* affected and *all economic damage* is also calculated. These averages become the center point of the x and y axes on the table, dividing the scatter chart into quadrants.

Hazard Impact Comparison for Multiple Hazards



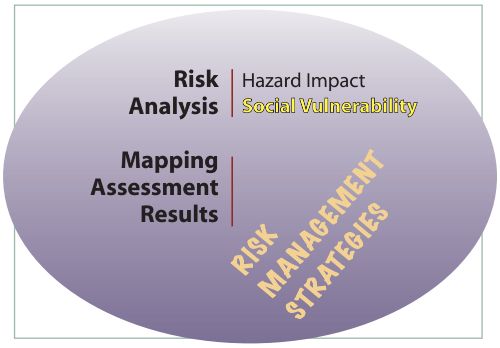
*The **upper right quadrant** indicates hazards with a high potential for loss of life and economic damage. These hazards would be first priority for mitigation.*

*The **lower right quadrant** indicates hazards with a high potential loss of life, and are a second priority for mitigation.*

*The **upper left quadrant** indicates higher levels of economic damage, and is a third priority for mitigation.*

*The **lower right quadrant** indicates low levels of loss of life or economic damaged (relative to other hazards). These hazards are the lowest priority for mitigation.*

Bi-variant analysis can also be used to compare the potential impact of hazards between villages within a region. These results can also be presented in table format and plotted on maps.



Social Vulnerability Assessment

In contrast to the *Hazard Impact Assessment,* the ***Social Vulnerability Assessment*** looks at the overall conditions within a community which contribute to:

- How severely a hazard will affect a community
- How well a community is prepared to respond to a hazard event
- The ability of a community to recover from a disaster

The *Social Vulnerability Assessment* results in a vulnerability index number which represents the vulnerability of the village to damage from a disaster.

The index number can be used to compare the relative vulnerability of several villages. This knowledge can be used to prioritize mitigation resources as well as the location of emergency stockpiles and other pre-disaster preparations.

The indicators determined to be important in understanding social vulnerability are set out in a conceptual diagram (on next page). A questionnaire is used to collect information on the indicators for the community being assessed. Answers to the questions come from information collected for the *Disaster Risk Management Baseline Survey.*

A sample ***Social Vulnerability Index Data Collection Form*** is in Annex I. The data collection form is set-up as an Excel® spreadsheet and includes the following columns:

"Group" (discussed in more detail below): The type of question being answered, organized on the basis of questions related to:
- –"Society (economy)"
- –"Security"
- –"Resources"
- –"Structures"
- –"Location"

"Question": The question to be answered.

"Mapping to Baseline": The location of the data in the *Baseline Survey* which answers the question.

"Range of Answer Scores": A predetermined range of answers to the question with numerical values assigned to each possible answer.

"Raw Score": The numerical value assigned to the selected answer. Answers are coded from 0 to 1, with 1 indicating an answer which contributes strongly to vulnerability and lesser values the opposite.

"Weight": A numerical value used to adjust the answer value ***(described further below).***

"Weighted Score": The "Raw Score" multiplied by the "Weight"

"Sub-Scores": The total of all "Weighted Scores" for each "Group"

The total vulnerability index score is created by adding the sub-scores together. This addition is done automatically by the spreadsheet as answers are entered.

The total vulnerability index score for a community can range from 0 to 1. The greater the score, the greater the level of social vulnerability. For instance, a community with a score of 0.874 has a higher social vulnerability than a community with a score of 0.492.

As noted above, the vulnerability assessment process incorporates two elements, "Group" and "Weighting", which need to be reviewed before a vulnerability assessment is completed. These two criteria are discussed below.

Group: Questions on the data collection form are assigned to different groups. Each of these groups represents a different type of relation between a question's answer and a broad classification of factors which contribute to vulnerability. In turn, each group of questions is assigned a proportion of the final vulnerability index number value indicating the relative importance of the group of questions in determining community vulnerability.

This proportional allocation needs to be reviewed before the vulnerability assessment is started to ensure the allocation accurately represents the social, economic or physical conditions of the communities where the assessment is conducted. This review leads to:

- An adjustment in the proportion of the total index score assigned each group
- A change to the number in the Proportion of Total Vulnerability Score column of the Vulnerability Index Calculation at the top right of the spread sheet

Weighting: The weighting of answers to individual questions also needs to be reviewed before the vulnerability assessment form is used. This review is necessary to ensure the weights assigned accurately reflect the social, economic and physical conditions where the assessment will take place.

Data allocation

Of the total score, the Social Vulnerability Index Data Collection Form (see sample in Annex I) makes the following allocations:

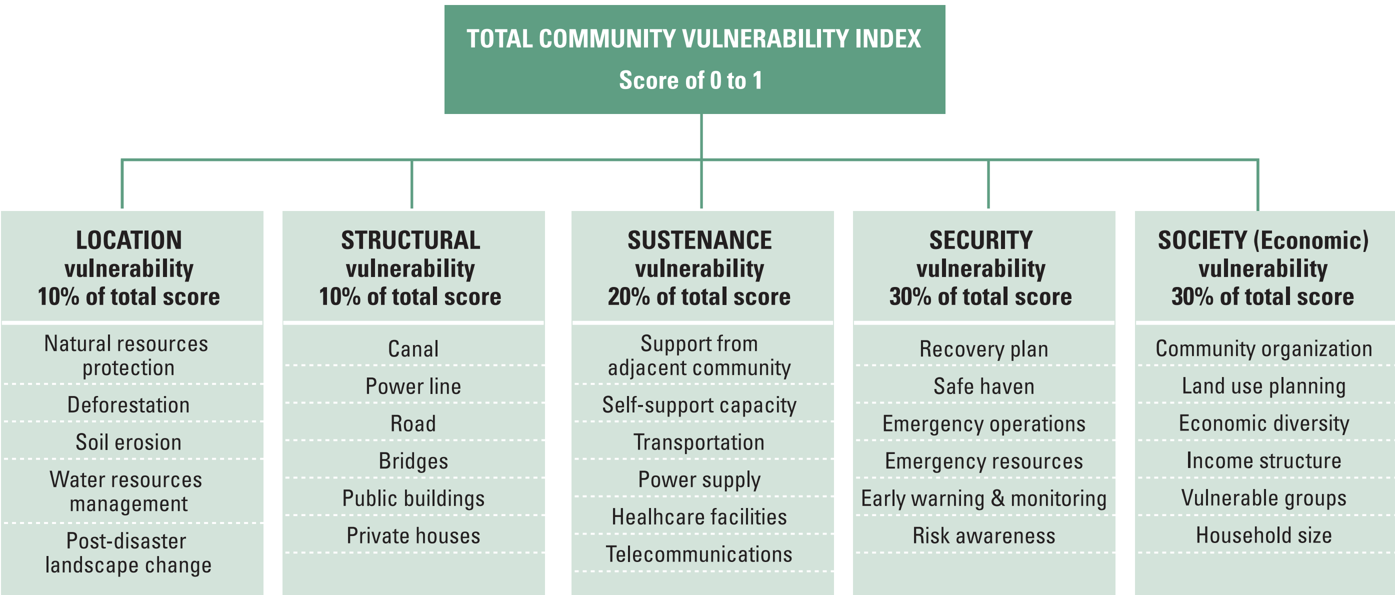
30% *to factors relating to "Society"*

30% *to factors related to "Security"*

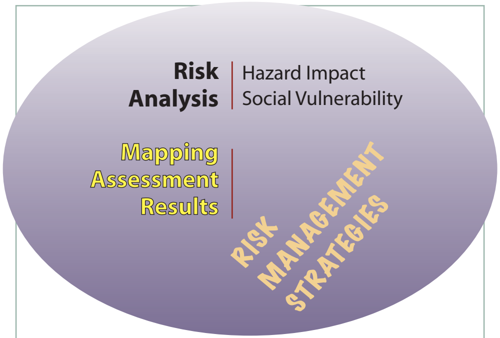
20% *to factors related to "Sustenance"*

10% *to factors related to "Structures"*

10% *to factors related to village "Location"*



Disaster Management Baseline Survey (>70 questions)



Mapping the results of the risk assessment process is a key process in transforming ***Risk Information*** *into* ***Risk Knowledge.*** *The mapping process takes data collected in the Baseline Survey and information generated from the* ***Hazard*** *and* ***Vulnerability*** *assessments and presents it in a way which can be easily used by communities and others involved in improving community resilience to disaster.*

Other Uses of Risk Maps

Risk maps have found several uses outside the community disaster risk management effort. These include:

- *Risk assessments for development projects*
- *Assessment of sites for larger scale risk reduction efforts*
- *School relocation*
- *Land use planning*

As developmental efforts increase in GBAO, risk and other map products can play an important role in providing guidance on how to avoid disaster risks or where these risks need to be mitigated.

This review is best done on a question-by-question basis by a group of individuals knowledgeable about conditions in the communities to be assessed. Given the number of questions to be reviewed, the review of the questions should be planned well in advance of the actual assessment.

Mapping Assessment Results

The mapping of baseline and assessment information:

- Creates a comprehensive village database which can be used by a village for disaster preparedness planning, mitigation and response activities
- Generates maps of village infrastructure, hazard impact zones and the threat posed by these hazards ("risk maps")
- Provides a graphical (map) and statistical base for planning mitigation activities
- Graphic evacuation routes and safe havens
- Empowers villagers with information to plan the development of their community while taking into account the threat and potential impact of disasters

Mapping outputs are also provided to the District and State/Provincial governments as well as government emergency management organizations. This information sharing helps the government in:

1) Administrative tasks, for example, risk maps can be used to plan a new road
2) Emergency operations and planning

The mapping process normally requires three staff working over a period of five to seven days, depending on the amount and completeness of the data provided. Sample job descriptions for GIS/mapping personnel are provided in Annex A.

The 13 tasks required to complete infrastructure, hazard and risk maps are described below. The tasks are based on the use of the ArcInfo® suite of mapping and data management software for the mapping process. Similar mapping systems can be used but may require some adjustment to the tasks.

The sample ***Checklist of Deliverables*** in Annex J is also useful in planning the mapping process and generating the required maps and reports.

Task One *Download GPS data to computer and convert to Shape® files.* The computer program Ozi Explorer® is used in this process.

Task Two *Create electronic folders for data from the Baseline Survey.* A standard data file hierarchy is provided on the following page.

Task Three *Create physical file folders for the Baseline Survey hard copy documents.* Field worksheets and documents are placed into these file folders once information has been transferred to the GIS. The physical file folder structure should be similar to the electronic file structure.

Task Four *Enter data from the Baseline Survey into appropriate folders and data formats.* Baseline data can be entered as Shape® files for GPS data, as JPG or other picture format, and in MS Word® for future narrative or reference use.

Task Five *Import Shape® files into ArcMap®* — can be part of Task Four.

Task Six *Call up digitized base map.* The base map contains elevations, rivers, roads and some other infrastructure. Base maps for the area where the assessment is taking place are digitized at the beginning of the project and stored in the GIS. Appropriate cartographic conventions should be followed in creating base maps and adding data to them.

Task Seven *Integrate digitized data from Baseline onto existing digitized base map.* Location data recorded by GPS and converted to Shape® files are imported into the base map. GPS data provides location data for boundaries of villages, hazard zones, structures and other infrastructure.

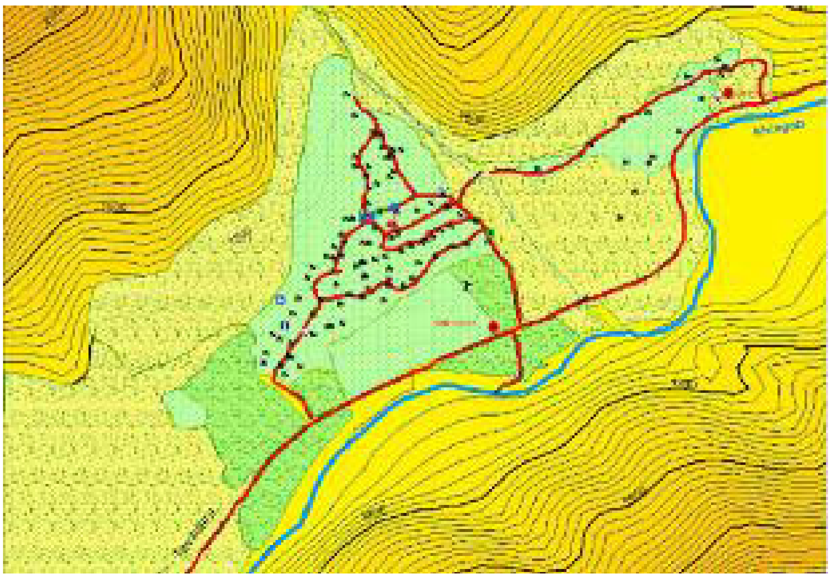
Task Eight *Compare GPS map data to information on field sketches and from field notes.* Accurate sketches and field notes are critical to making this process work smoothly. Field staff should be available to the GIS team to interpret field notes/sketches and answer questions.

Task Nine *Correct data on digital maps as needed.* This is done by using a mouse to make corrections on the digital map. Corrections can be a time consuming process if there are numerous inaccuracies due to poor data collection.

Task Ten *Insert symbols onto the digital map base corresponding to items recorded using the GPS.* A standard set of symbols are used. Symbols represent houses, other buildings, roads, rivers, canals, electrical transformers, air strip/heliports, bridges and other critical infrastructure noted during the *Baseline Survey*. A sample of standard symbols is shown on the right and a full set of mapping symbols is in Annex K.

As symbols are added to a map, they are also incorporated onto the map *Legend*. The Legend generation process is done using ArcMap®. Appropriate cartographic standards should be followed in creating a Legend. A Legend should be provided for each map produced.

Task Eleven *Produce an Infrastructure map for the village.* This map is generated automatically using ArcMap®. The map presents all critical infrastructure, including roads, houses, electrical transformers, canals, offices, warehouses, bridges, and warehouses for which data has been collected during the *Baseline Survey.* A snapshot of an *Infrastructure* map is shown here. See page 54 in the *Technical Notes & Maps* section for the full map.



Infrastructure Map "snapshot" showing details of roads, houses, buildings and electrical transformers.

BASELINE DATA ENTRY FILE HIERARCHY

↓

1st LEVEL Administrative Division

↓

2nd LEVEL Administrative Division

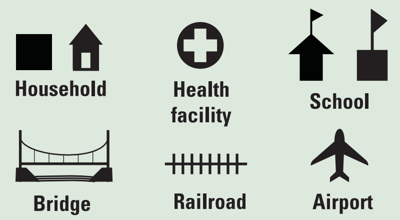
↓

3rd LEVEL Administrative Division

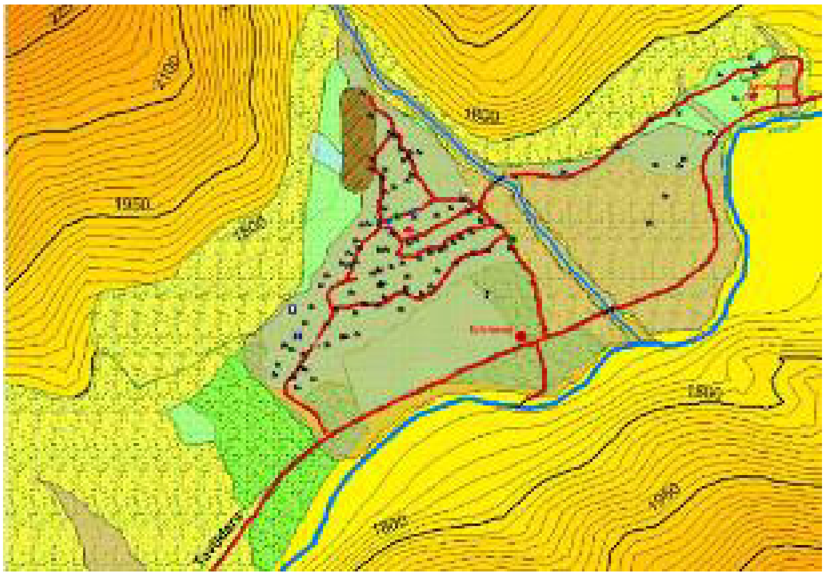
↓

GPS *Shape®* files	Photos	Other
Track lines Village boundary Land use Canal Road Impact zone area	**Social objects** Shop Club Mosque School Health Safe havens	**Word files** Seminar report Geological report Summary report
Coordinate points Households Social objects Critical infra-structure	**Infrastructure** Bridge Airport Helipad	
	Hazards	
	Seminars/ training	
	Mitigation projects	
	Communication systems	

Typical symbols used in maps

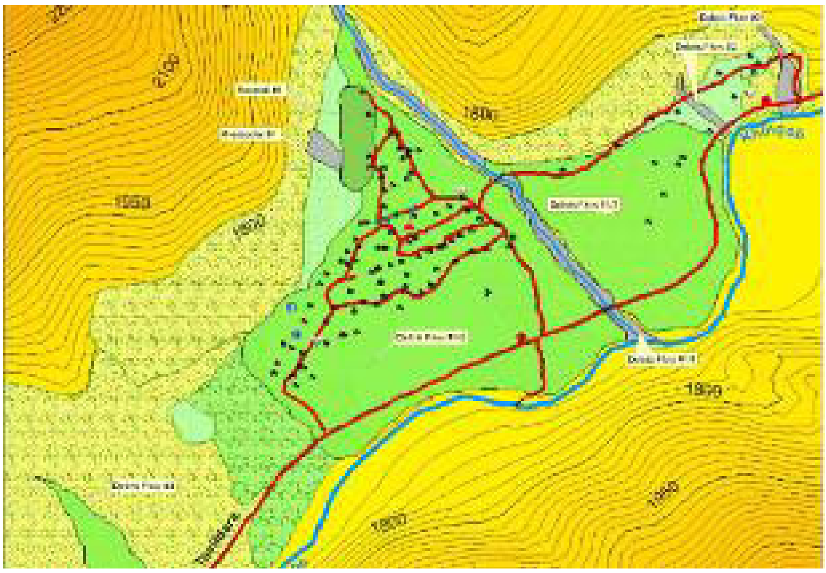


Task Twelve *Produce a "Hazard" map.* This map is generated automatically using ArcMap® by combining data on hazard impact zones with the Infrastructure map. Several hazard impact zones may be noted for one hazard impact area, depending on different scenarios developed in the field. A snapshot of an Infrastructure map is shown below. A full map is on page 55 in the *Technical Notes & Maps* section.



Hazard Map "snapshot" showing infrastructure details and marked debris flow, rockfall and avalanche zones.

Task Thirteen *Produce a "Risk" map.* This map indicates the importance (severity) of each hazard by impact zone. This map is produced by color coding each hazard impact area presented on the Hazard map based on the assigned risk. The risk data is the output of the preceding risk analysis process. The Risk map also includes all potential mitigation activities identified during the *Baseline Survey* and entered as narrative information. The potential mitigation activities are noted by specific symbols to facilitate discussion with a community on the selection and execution of these efforts. A snapshot of an Infrastructure map is shown below. A full map is on page 56 in the *Technical Notes & Maps* section.



Risk Map "snapshot" showing infrastructure and providing level of risk information for the marked debris flow, rockfall and avalanche zones.

Risk Knowledge Dissemination

Community Disaster Mitigation Activities

Enabling of communities to reduce the impact of hazards and potential disasters in their villages is a theme which runs through the community disaster risk management process. Integrating an engineer with a mitigation mandate into the process of producing the *Baseline Survey* ensures the identification of mitigation activities runs concurrently with the *Baseline Survey* and community disaster planning efforts.

Focusing mitigation responsibilities on an engineer is deliberate. Many of the hazards in mountain areas pose direct physical threats to where villagers live and work on a daily basis. Addressing these impacts with physical countermeasures is often a village priority.

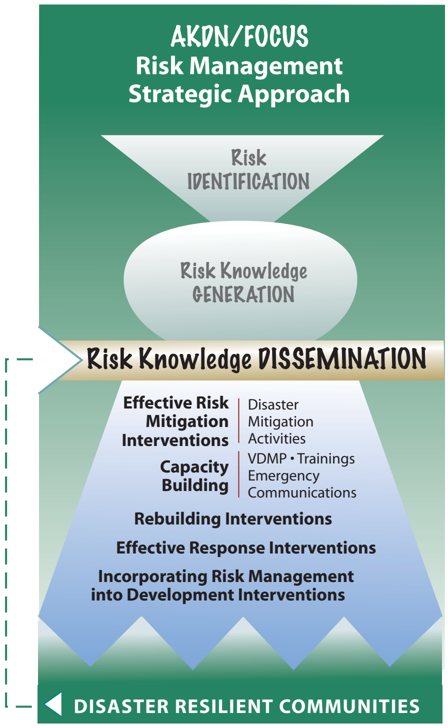
Disaster mitigation: structural and non-structural

Disaster Mitigation is accomplished through a range of measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards.

Structural measures refer to any physical construction to reduce or avoid possible impacts of hazards, which include engineering measures and construction of hazard-resistant and protective structures and infrastructure.

Non-structural measures refer to policies, awareness, knowledge development, public commitment and methods and operating practices, including participatory mechanisms and the provision of information which can reduce risk and related impacts.

– Adapted from: ISDR www.unisdr.org/eng/library/lib-terminology-eng%20home.htm



Community Disaster Mitigation Activities

These activities take place under the ***Risk Knowledge Dissemination*** *segment of the* ***Strategic Approach*** *linking assessment results to* ***Effective Risk Mitigation Interventions.***

At the same time, mitigation efforts should not be one-sided. Non-structural mitigation measures should have an important place in community disaster management efforts. The identification of evacuation routes and safe havens is one practical non-structural mitigation measure which can be applied in most villages.

Villagers should be encouraged to use local knowledge of hazards and impact areas to develop warning systems. In many cases, promoting local knowledge for early-warning strengthens the link between the disaster awareness message of the *Village Disaster Management Plan (VDMP)* and traditional practices in a village.

There is also a strong gender-cognizant aspect to mitigation activities. Women should be integrally involved in selecting and implementing mitigation activities. In many cases, women's views will decide the priority of specific mitigation actions.

The importance of the woman's voice in the selection of mitigation activities is two-fold:

First, there are usually more women than men in many mountain communities on a constant basis, as men tend to migrate for employment. Thus, hazard risk is proportionally greater for women.

Second, many of the activities engaged in by women are in hazardous locations. In particular, many women engage in home-based activities, and homes are often located in or near areas at risk of landslides, mud and debris flows, rock falls and flooding.

Mitigation activities are:

- Identified during the *Baseline Survey*
- Discussed with the community at the end of the survey and during the presentation of the Village Disaster Management Plan

Following the formal presentation of the CDRMP, further consultations are held with a village, local and regional government (emergency management agency) and external organizations (e.g. within FOCUS) on the selection of communities for specific mitigation activities.

The selection of village-level mitigation activities occurs in three stages. The selection process starts with the engineer during the *Baseline Survey* as he works with the geologists and community members on practical solutions to the hazards identified. The initial mitigation recommendations are discussed with the village during the workshop on the fifth day of the survey.

Once back from the field, survey team members use the risk analysis and risk mapping outputs to refine the identification of critical hazards in a community as a further basis for discussions on possible mitigation measures.

A final decision on specific mitigation measures is based on the following combination of factors:

1) How urgent is the need for mitigation?
2) Does the activity address a significant hazard threat?
3) Will the mitigation activity benefit the largest number of persons?
4) How strong is community support for the proposed activity?
5) Are local resources (e.g., rocks, sand, labor) available to support the activity?
6) Can the work be completed in a reasonable time period?
7) Can other (additional) resources be mobilized to support the mitigation activity?
8) Is it likely the village will be able to maintain the activity from their own resources?

The final selection of mitigation activities is a balance between need and realistic expectations. Where addressing a hazard risk with a physical structure may not be possible, non-structural mitigation actions, such as warning systems and evacuation routes, are good alternatives.

To the greatest degree possible, the final decision on mitigation activities, structural as well as non-structural, should include a significant input from the communities affected by the hazard. Without strong local support for a mitigation activity, it is unlikely the activity will be implemented effectively or maintained once it is completed.

Typical mitigation activities in mountain areas

The selection of a mitigation activity depends on the local impact of a hazard. The following list covers activities typical for the GBAO area.

- *River bank stabilization*
- *Debris flow channels*
- *Stream channeling*
- *Drainage*
- *Canal lining (to prevent high ground water levels)*
- *Repairs to building foundations*
- *Evacuation bridges*
- *Avalanche warning signs*

The challenge of too many mitigation needs

In many communities where FOCUS has worked, the number of mitigation activities identified exceeds available resources. In some cases, there were numerous activities. In others, a single mitigation project would have used all the project resources.

FOCUS met this challenge by selecting activities which met immediate needs within resource limitations. At the same time, FOCUS advocated with the government for resources for other projects that FOCUS could not handle. This advocacy was supported by the hazard and risk maps developed by the project.

While this approach was not a perfect solution for the challenge of too many mitigation needs, it allowed the most immediate needs to be addressed while drawing attention to requirements which needed to be met from other sources.

Once a village has been selected for a mitigation activity, an eight step process is applied to initiate, manage and conclude the activity:

Step One The engineer meets with the village leaders and discusses:

- The proposed mitigation activity
- Conditions which apply to supporting the village effort
- How the activity will be managed

District, local disaster management and other government staff participate in this initial meeting. This meeting includes a detailed inspection of the mitigation site and a subsequent drafting of technical design documents and a bill of quantities by the engineer.

If a community decides to proceed with the mitigation activity, a formal request is made and a draft activity proposal is developed with the help of the engineer. (A sample of an activity request form and proposal outline can be found in Annex L.)

Typical local early-warning measures

- *Anticipating the size of a debris flow by the size of rocks in the early part of the flow.*
- *Monitoring the temperature in up-slope areas to judge how fast the snow will melt. (Snow melt leads to floods and debris/mud flows.)*
- *Monitoring snow accumulation in known avalanche source areas.*

Other measures can be identified in discussions with community members.

Step Two A workshop on the mitigation activity is held with the village. A sample of the plan for this workshop is provided in Annex M.

The purpose of the workshop is to formally discuss with the villagers the details of the mitigation activity. Workshop topics covered include:

- Criteria for selecting the mitigation activity
- How the activity will be implemented
- Key issues to be resolved before the activity starts
- A "Project Action Plan" covering all the stages of the activity
- A budget
- Selection of individuals responsible for the project, including:
  - A manager, an unpaid position overseeing the whole activity
  - A specialist, a full time paid position directly managing the work site
  - An observer, an unpaid position, to verify work has been done as agreed and without any problems. This position is often held by a woman.

- The selection of workers for the activity and agreement to compensation, work periods and related issues. Normal mitigation activities have a workforce of 20 to 30 persons drawn directly from the areas to benefit from the mitigation activity.
- A review of procurement procedures and plans
- Warehouse management
- Procedures for project completion and the need for ongoing maintenance

Discussions at the workshop lead to an agreement as to who will cover which costs associated with the project. In general,

- External funding covers wages, the cost of cement and tools (and their transport to the village) while,
- The village is responsible raw materials, such as rocks and sand.

However, to ensure good community buy-in to the project, the division of support for the project should be negotiated to encourage the greatest level of village support possible.

Where possible, support from local or regional government should be secured for a project. In some cases, this support may be in the form of a pledge to include the mitigation structure in government maintenance plans once the activity has been completed.

Step Three Signing of an agreement between FOCUS and the village on the mitigation activity. (A draft agreement can be found in Annex N). Where possible, the agreement is concluded at the end of the workshop described in Step Two, or shortly thereafter, if required by administrative procedures.

Step Four The manager and specialist visit the project office and collect delivery orders for the construction materials to be provided to the project. In GBAO:

- Suppliers are selected on the basis of competitive bids
- The manager, specialist and engineer take the delivery order to the selected supplier
- The manager and specialist take delivery of the construction materials and transport them to their village (Transport costs were a village contribution to the mitigation activity cost.)

Step Five The engineer, manager, specialist, observer and workers assemble at the project site for an initial on-site review of the work to be done. Local government officials and the local emergency management agency representative are usually present at the on-site start-up meeting. At the meeting:

- The stages of the work are discussed
- The engineer provides any clarifications needed
- Specific technical issues are resolved

Step Six The engineer conducts a regular (weekly) monitoring visit to the project site. During these visits, any technical or procedural issues are resolved and quantities of materials (e.g. cement) are checked. A report is completed after each monitoring visit (See sample in Annex O).

Step Seven Before official completion of the mitigation activity, the engineer, manager, specialist, observer and local officials:

- Visit the work site
- Verify that all the work has been completed satisfactorily and according to the technical specifications
- Agree on plans for resolving any outstanding issues
- Set a date for an official handing over of the project to the community

Step Eight A formal handover of the mitigation activity takes place in the presence of district and village officials, as well as the local emergency management agency representative. At this point, workers are paid according to the terms of the contract executed at the beginning of the activity. Discussions are also held on the maintenance of the mitigation works.

A formal project completion report is completed at the time of the handover (See sample in Annex P). The project engineer also completes a project data sheet (See sample in Annex Q). A copy of the project data sheet is provided to the community and all documents are kept on file at the project office.

Periodically after the end of the activity, the engineer may make inspection visits to the site to check conditions of the construction and maintenance. Observations from these visits are provided to local officials and used in planning future mitigation activities.

Capacity Building

Village Disaster Management Plan

The Village Disaster Management Plan (VDMP) is based on information collected during the *Baseline Survey*, the outputs of the Risk Analysis and discussions with the community. The VDMP is intended to succinctly set out how a village can:

- Respond to disasters if and when they occur
- Mitigate the impacts of potential disasters

Functionally, the plan is divided into two sections. The first section identifies what people should know and do ***before***, ***during*** and ***after*** a disaster, including:

- The location of hazards, impact areas and risk levels in a village
- What the local village "Support Team" (discussed below) must know about hazards in the village
- Actions a community might take for hazard risk reduction before a disaster occurs.

The second section of the plan includes:

- General information about the community collected in the *Baseline Survey*
- The characteristic of each natural hazard threatening a community
- Information about vulnerability of the village inhabitants and infrastructure in the case of a disaster

Capacity building *activities under the* ***Risk Knowledge Dissemination*** *segment of the* ***Strategic Approach*** *increase the ability of target communities to prepare for, respond to and recover from disasters. These activities include disaster planning, training and improved communications.*

Beyond disaster plans

Disaster plans and training are useful to communities. However, other more concrete measures are also needed to address the impact of disasters. The isolation of many communities in GBAO means that local stockpiles of essential supplies need to be established in preparation for disasters.

Going beyond just providing stockpile supplies, FOCUS implemented an activity where repayments from loans to a village can be used by the village to fund disaster-related activities including stockpiles, mitigation project and assistance to disaster victims.

The loan repayment funds are not intended to be self-sustaining. However, this availability of funds provides the basis for a community-supported disaster support fund with which to undertake mitigation activities or provide local relief assistance.

The VDMP provides a starting point for a village and other levels of government to conduct further research into:

- The cause of hazards and the vulnerability of a community
- The character and periodicity of disasters and their impact on the population's life and economic activities
- The consequences of inadequate construction and inappropriate land use

Development of a VDMP begins during the *Baseline Survey.* An initial draft VDMP is discussed with the village on the fifth day of the survey using information collected during the field work.

Finalization of the VDMP begins with the entry of field data into the GIS data base and production of the *Infrastructure, Hazard* and *Risk* maps (see pages 54-56). After this data processing is completed, individuals involved in the field assessment meet to:

- Review the results of the risk assessments
- Discuss potential structural and non-structural mitigation activities

These discussions and feedback from the draft VDMP developed by the community are used to formulate the final VDMP. A sample of the ***Village Disaster Management Plan*** form can be found in Annex G.

The finalized VDMP is the center piece of a one day workshop on "Risk Reduction and Disaster Preparedness of Communities". Annex R provides a detailed sample plan for the workshop.

The workshop is guided by the same team of geologists, community mobilizer, engineer and GIS field officer that conducted the field assessment. This workshop is open to village members, local government officials, emergency agency staff, NGOs and others from neighboring areas who may be involved in mitigation or disaster relief activities.

In addition to discussing the field assessment and risk mapping results, the workshop covers:

- Monitoring of hazards areas
- Early-warning
- Mitigation activities
- Safe havens and evacuation routes
- A family and community focused discussion of what to do before, during and after a disaster.

The family and community focused discussion orients the workshop to how the risk assessment results can help village members prepare for, survive and begin recovering from a disaster. This approach forges a link between the technical risk assessment exercise and village views and expectations. In turn, this leads to greater buy-in to the disaster management and associated risk mitigation activities.

The final technical session of the workshop is devoted to establishing a ***Village Support Team.*** This team works within the village on efforts to mitigate hazards as well as assisting in the case of a disaster. Activities by the Village Support Team are linked to government emergency management efforts and support is provided by NGOs and other organizations, depending on the local situation.

A Support Team Leader is selected by the village and individuals are designated as responsible for:

- Communications (the radio operator if a radio is installed in the village — see below on Strengthening Community Level Emergency Communication)
- Search and rescue
- First aid (often the local medical personnel)
- Transport (someone who owns one or more vehicles)
- Food and other basic resources (often a store owner)
- Fire control
- Recovery activities
- Lodging and sanitation
- Psychological support.

More than one person can be a member of the team for a specific responsibility.

During the VDMP workshop, team members are provided with basic guidance as to their responsibilities. An effort is made to match team responsibilities to an individual's normal daily activities (e.g. first aid and a nurse in the village). However, additional training may be needed for some team members. This training can be provided by the governmental emergency management agency or NGOs (e.g. the Red Crescent).

Strengthening Community Level Emergency Communications

The GBAO Experience The lack of quick, reliable communications was often cited as major problem by communities in GBAO. Before 1991, GBAO had a reliable public communications system which reached all communities of any size in the region. Additionally, the police, military and other government services had dedicated communication systems.

Unfortunately, the disruption following Tajik independence, as well as a lack of funding, meant that most of the pre-independence communications systems had largely ceased to function by the late 1990s. The result was that it was extremely difficult for information to circulate between mountain communities and within GBAO in general.

In the event of a disaster, the lack of accurate information could mean a simple inconvenience, such as being blocked for a few hours by debris flow. Or it could mean much worse, such as being trapped in a valley between avalanches for several days in severe winter weather.

More critically, when disasters occurred, the lack of functioning communications systems made it difficult for villages to advise outsiders that a disaster had occurred. In addition, villages:

- Could not receive information about hazard conditions in surrounding areas
- Could not take actions to avoid or limit disaster impacts
- Authorities received late and often inaccurate information on disasters, thus limiting the effectiveness of relief and recovery.

Reducing the isolation of mountain communities

The HF radio system has brought other social benefits to isolated mountain communities. When not used for official purposes, the system is used to share information on local road conditions, as well as social events such as weddings. This "unofficial" use of the radios strengthens local buy-in to the system and helps reduce the isolation of communities in GBAO.

Over three DIPECHO projects (2003-2006), FOCUS worked with communities to establish an extensive, reliable and functional emergency communications system in GBAO. These efforts were intended to create a community-managed and community-owned emergency management communications system. At present, 77 villages are covered by the system. A total of 44 radio units were provided through DIPECHO funding. Radios for the remaining villages have been funded through the Lake Sarez Risk Mitigation Project and the Japanese Social Development Fund project.

The GBAO system uses HF (CODAN™) radios powered by a combination of batteries and solar panels. A deliberate decision was made to place a community radio in a home in a village instead of a government office. This permits:

- More constant monitoring of the radio (houses are occupied for more of the day than offices)
- Enhanced reinforcement of the idea that the radio belongs to the community, rather than to a government administrator

The home in a village where a radio would be located was selected during the *Village Disaster Management Plan* workshop.
Basic criteria for placing a radio in a household were that:

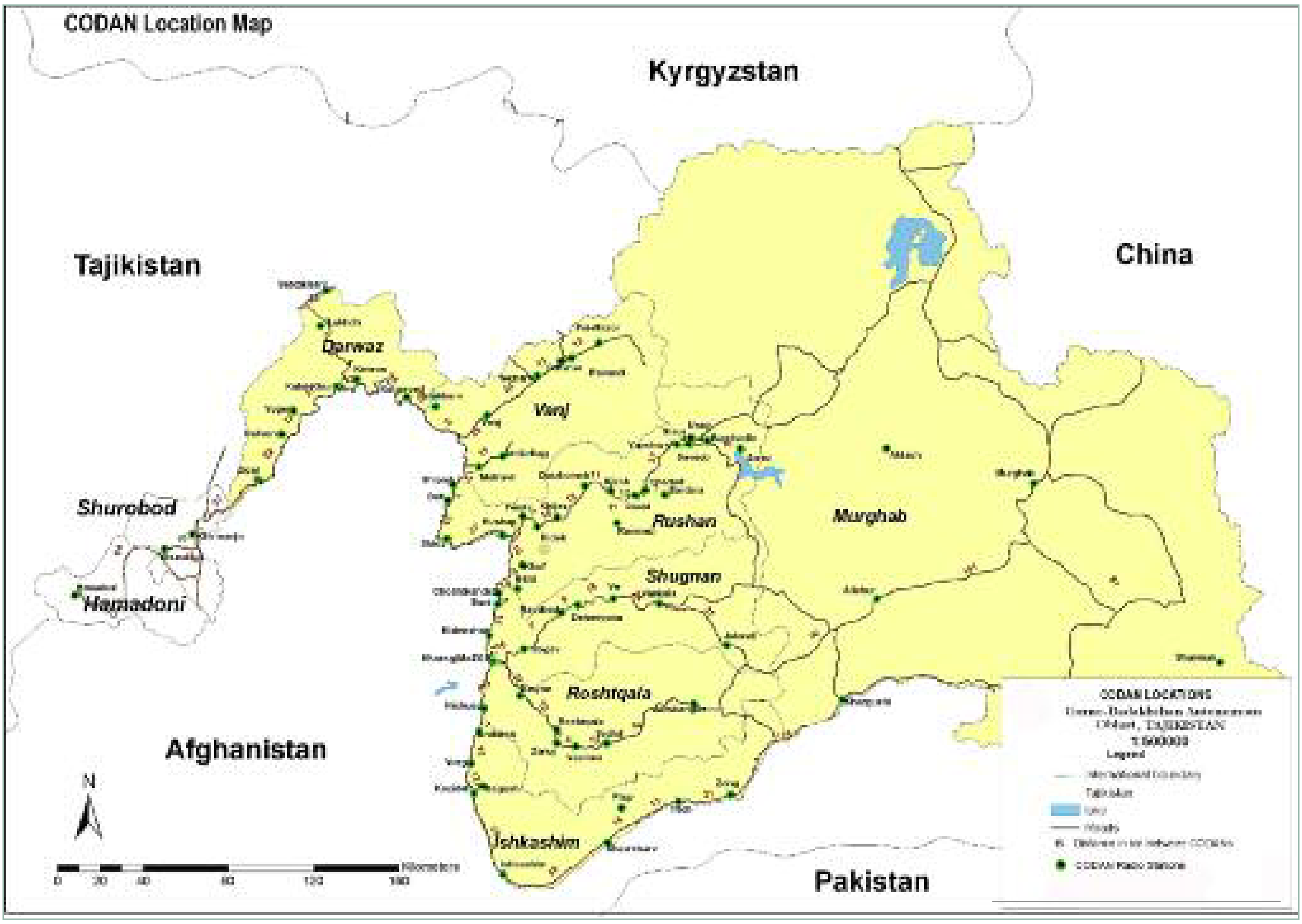
- Someone would be available on a constant basis to monitor and to use the radio
- The "communications manager" would agree that the radio would not be used for personal ends and would be available to all within the village
- FOCUS would provide training to radio operators (see sample in Annex S).

To ensure that there are no problems with the system or individual radios, regular reports are provided by each radio starting at 0800, with contact restablished every two hours for the remainder of each day. These reports are provided to the CoESCD in Khorog and include any disaster or emergency-related information from each community in the system.

The linking of a community-based communications system to the government emergency management structure is one of mutual benefit. By receiving regular reports, CoESCD in Khorog is exceptionally well informed on a daily basis of conditions within GBAO. The direct contact between CoESCD and communities allows for a rapid response when a disaster has occurred.

CoESCD's involvement in the communications system also allows it to share information collected from different parts of GBAO with others who may come into risk from disaster conditions. For instance, information on road conditions is routinely collected by CoESCD and shared with media and other parts of the government in the winter. This information:

- Helps road maintenance teams keep roads open
- Helps travelers to make informed decisions as to where and when to travel.



Map of CODAN Radio installations

Why are communications systems important?

Rapid and accurate communications are keys to early-warning and a proactive response to disasters. Without good communications, the impact of a disaster is usually worse and the recovery process slowed.

The GBAO experience is unusual due to the breakdown of previously existing communication systems. However, it also demonstrates why an effective communications system is so important in mountain areas.

Without effective communications, each mountain village is on their own in the case of a disaster. In the case of river flooding, the lack of effective communications prevents downstream communities from receiving warnings of rising river levels on a real time basis. The lack of this information can lead to an unnecessary loss of life and damage to homes, businesses and productive assets.

The nature of the communication system, as a structure, is also important. The GBAO system links isolated communities with district and regional government and particularly the emergency management agency, CoESCD. These links take place across the region as well as within districts.

Thus, the communication structure is one which ties together villages and the governmental system through a process of mutual benefit. These connections, which are as much social as they are physical, are important in ensuring that mountain communities can access timely assistance and support in times of disaster.

Learning from Experience

The advantages of a community-based emergency communications system are elaborated on the previous page. However, it is also important to recognize potential pitfalls which should be avoided in establishing such a system.

One pitfall is that the solar panel and battery system used to power the radio are of considerable value and can be used for purposes other than running the radio. New batteries provided for a radio may be replaced by old, worn out batteries. This significantly reduces the operability of the radio during periods of reduced sunlight. The solar charger can also be used to charge other batteries, resulting in the battery for the radio running down. While these problems are not usually significant, a close monitoring of radio installation may be necessary to avoid the equipment being used for unintended purposes and in ways which limit the effectiveness of the radio system.

The second pitfall is that the radio system may not function in an emergency due to technical problems, such as drained batteries or damaged solar panels. This situation develops as a result of infrequent use of radios and other problems (e.g. absent operators) not being noted before the system is needed in an emergency. The easiest way around this pitfall is to have the system in constant use. In GBAO, this is accomplished with the daily check-in and reporting, as well as allowing some level of "unofficial" communications to occur.

A final point is that the ownership of the radios, and radio system as a whole, should be clearly vested in the communities involved in the system. Community ownership ensures:

- Proper operation and maintenance of the radio
- A willingness of village members to monitor the radio on a constant basis
- The overall sustainability of the communications system

FOCUS recognized that community ownership was key to the successful operation of the communication system early in the DIPECHO projects. As a result, FOCUS made strenuous efforts to ensure that each radio was treated as community property and was not under the control of a distant government office. This effort has been successful, with constant use of the system by communities and CoESCD recognition that the system represents a public-private-community partnership of mutual benefit, rather than a system under direct government control.

Collaboration with the Government

The GBAO experience has been closely linked to government organizations. As the head of Roshtqala District put it, the FOCUS Fostering Disaster Resilient Communities in Isolated Mountain Areas project is a three-sided effort between villages, the government and FOCUS.

While the emphasis of community disaster risk management is on increasing community resilience, the involvement of the government makes practical sense. For instance, CoESCD, with staff at the state and district levels, is the government organization which leads the response to disasters. Pursuing community disaster risk reduction without involvement of CoESCD would be like building a stool with only two legs: it does not work. FOCUS has promoted this type of public-private-community partnership throughout its disaster risk reduction and developmental efforts in GBAO.

Collaboration with the government supports a range of activities under the ***Risk Knowledge Dissemination*** segment of the ***Risk Management Strategic Approach,*** particularly in terms of *Capacity Building, Risk Mitigation* and *Effective Response.* This collaboration has occurred in a number of ways.

CoESCD staff are involved in mitigation projects as well as being recipients of community-level risk analysis and maps. CoESCD is linked into the project HF network and is a key element in the future sustainability of this system.

FOCUS assisted CoESCD in developing a disaster documentation and reporting database (the Incident Reporting System – IRS) and worked with CoESCD and the GBAO Hydro-metrological Department in transferring records to digital form for future use. These efforts have included computer training for government personnel, with the objective of building local capacity to run the project-developed risk assessment and mapping GIS without outside support.

To ensure government officials are aware of and able to use the results of community disaster risk assessments, FOCUS has held workshops with district and state-level officials. These workshops are held to:

- Acquaint government representatives with the activities of FOCUS in Tajikistan and the DIPECHO project
- Provide information about hazard, vulnerability and risk assessment results for villages in a district (for district level officials) or several districts (for state-level officials)
- Discuss community-based small-scale structural mitigation projects and the installation of HF radios.

Local government use of risk maps

One district official commented that the risk maps provided by the project were useful in knowing where damage from hazards might occur.

Although she was a native of the district, the official said she was not fully aware of all the hazards and under which conditions they could result in disasters. She noted that risk maps provide the government with information to use in deciding whether to allow people to build houses. With the hazard zones clearly marked on the maps, avoiding these zones became much easier.

The risk assessment maps and baseline survey information are used in the technical sessions of the workshop and to guide discussions of risk and mitigation activities in specific villages.

The district and state level workshops are a practical way to share risk assessment results and mitigation plans with government authorities. These workshops also increase the level of government ownership of the overall risk reduction effort. (Sample plans for district and state level workshops can be found in Annex T.)

Collaborating with and providing targeted support to governmental agencies is part of a process of ensuring sustainability of the community-based disaster risk management effort. FOCUS activities are supported with short-term funding, raising the issue of how the project-initiated efforts will be sustained over the long term.

The following actions can promote greater sustainability of disaster management efforts at the community level:

- Involving government
- Linking communities and the government through systems such as the HF radio
- Ensuring the project outcomes support local government.

Technical Notes & Maps

Key Terms

The following table of key terms used in the *Guide* is adapted from definitions provided by the International Strategy for Disaster Reduction.
www.unisdr.org/eng/library/lib-terminology-eng%20home.htm

Disaster

A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources.

A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk.

Disaster risk management

The systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards.

Disaster risk reduction (disaster reduction)

The conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.

The disaster risk reduction framework is composed of the following fields of action, as described in ISDR's publication 2002 "Living with Risk: a global review of disaster reduction initiatives", page 23:

- *Risk awareness and assessment including hazard analysis and vulnerability/capacity analysis*
- *Knowledge development including education, training, research and information*
- *Public commitment and institutional frameworks, including organizational, policy, legislation and community action*
- *Application of measures including environmental management, land-use and urban planning, protection of critical facilities, application of science and technology, partnership and networking and financial instruments*
- *Early-warning systems including forecasting, dissemination of warnings, preparedness measures and reaction capacities*

Geological hazard

Natural earth processes or phenomena that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Geological hazard includes internal earth processes or tectonic origin, such as earthquakes, geological fault activity, tsunamis, volcanic activity and emissions as well as external processes such as mass movements: landslides, rockslides, rock falls or avalanches, surfaces collapses, expansive soils and debris or mud flows.

Geological hazards can be single, sequential or combined in their origin and effects.

Geographic Information Systems (GIS)

Analyses that combine relational databases with spatial interpretation and outputs often in the form of maps. A more elaborate definition is that of computer programs for capturing, storing, checking, integrating, analysing and displaying data about the earth that is spatially referenced.

Geographical information systems are increasingly being utilised for hazard and vulnerability mapping and analysis, as well as for the application of disaster risk management measures.

Hazard

A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydro-meteorological and biological) or induced by human processes (environmental degradation and technological hazards). Hazards can be single, sequential or combined in their origin and effects. Each hazard is characterized by its location, intensity, frequency and probability.

Hazard analysis

Identification, studies and monitoring of any hazard to determine its potential, origin, characteristics and behavior.

Hydro-meteorological hazards

Natural processes or phenomena of atmospheric, hydrological or oceanographic nature, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Hydro-meteorological hazards include: floods, debris and mud floods; tropical cyclones, storm surges, thunder/hailstorms, rain and wind storms, blizzards and other severe storms; drought, desertification, wildland fires, temperature extremes, sand or dust storms; permafrost and snow or ice avalanches. Hydro-meteorological hazards can be single, sequential or combined in their origin and effects.

Mitigation

Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards.

Natural hazards

Natural processes or phenomena occurring in the biosphere that may constitute a damaging event.

Natural hazards can be classified by origin namely: geological, hydrometeorological or biological. Hazardous events can vary in magnitude or intensity, frequency, duration, area of extent, speed of onset, spatial dispersion and temporal spacing.

Preparedness

Activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early-warnings and the temporary evacuation of people and property from threatened locations.

Prevention

Activities to provide outright avoidance of the adverse impact of hazards and means to minimize related environmental, technological and biological disasters.

Depending on social and technical feasibility and cost/benefit considerations, investing in preventive measures is justified in areas frequently affected by disasters. In the context of public awareness and education related to disaster risk reduction, changing attitudes and behaviour contribute to promoting a "culture of prevention".

Recovery

Decisions and actions taken after a disaster with a view to restoring or improving the pre-disaster living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk.

Recovery (rehabilitation and reconstruction) affords an opportunity to develop and apply disaster risk reduction measures.

Relief / response

The provision of assistance or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term or protracted duration.

Risk

The probability of harmful consequences or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions.

Risk is conventionally expressed by the notation: Risk = Hazards x Vulnerability.

Some disciplines also include the concept of exposure to refer particularly to the physical aspects of vulnerability.

Beyond expressing a possibility of physical harm, it is crucial to recognize that risks are inherent or can be created or exist within social systems. It is important to consider the social contexts in which risks occur and that people therefore do not necessarily share the same perceptions of risk and their underlying causes.

Risk assessment/analysis

A methodology to determine the nature and extent of risk by analyzing potential hazards and evaluating existing conditions of vulnerability that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend.

The process of conducting a risk assessment is based on a review of both the technical features of hazards such as their location, intensity, frequency and probability, as well as the analysis of the physical, social, economic and environmental dimensions of vulnerability and exposure while taking particular account of the coping capabilities pertinent to the risk scenarios.

Structural / non-structural measures

Structural measures refer to any physical construction to reduce or avoid possible impacts of hazards, which include engineering measures and construction of hazard-resistant and protective structures and infrastructure.

Non-structural measures refer to policies, awareness, knowledge development, public commitment and methods and operating practices, including participatory mechanisms and the provision of information which can reduce risk and related impacts.

Vulnerability

The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards.

For positive factors, which increase the ability of people to cope with hazards, see the full set of definitions available at www.unisdr.org/eng/library/lib-terminology-eng%20home.htm.

Data Sources and Formats for Disaster Risk Management Assessments

Data collected should cover the region and communities in which the assessment is to take place.

Data Set	Likely Source	Format Required
Presence of disaster management capacities: communities with known disaster plans, disaster response teams or emergency management agency staff	Emergency management agency and local government	Geo-referenced information to be added to community database
Population data (number of persons in each community, disaggregated by gender and by age, if possible)	National and local statistics offices and census	Spreadsheet
Past disasters, by year and type, with number of killed, injured and economic damage for the region with specific sites (communities) of events indicated	Government emergency management agency, national geological organization, local newspapers and center for the Epidemiological Study of Disasters, "EM-DAT" International Disaster Database: www.em-dat.net	Spreadsheet or GIS data file
Hydro-metrological data (rainfall, snow levels, river level, flood data, by location and day or month)	Ministry of Water, meteorological service and hydrological service	Spreadsheet or GIS data file. The data should be linked to specific locations (e.g., latitude and longitude or place name)
Topographical maps covering the region and communities to be assessed at 1:10,000 scale	Commercial suppliers, national mapping office, military and local government	GIS-useable digital format and hard copies.
Geophysical maps covering the region and communities to be assessed at 1:10,000 scale	Commercial suppliers, national mapping office, military and local government	GIS-useable digital format and hard copies.
Aerial images (photos) preferably at 1:10,000 scale	Commercial suppliers, national mapping office, military, and local government	GIS-useable digital format and hard copies.
Satellite images (photos) preferably at 1:10,000 scale	Commercial suppliers, national mapping office, military, local government and Google Earth: http://earth.google.com	GIS-useable digital format and hard copies.
Maps of known hazard zones (land slides, rock falls, avalanches, mud flows, debris flows, flood zones and known fault lines)	Emergency management agency and national geological organization	GIS-useable digital format and hard copies.
Names and contact information for local government officials	Local government, phone book and internet	Hard copy to be entered into the community database
NGOs working in the target communities	Local government and local NGO coordination arrangement	Hard copy to be entered into the community database
Housing data (number and type of housing)	Local government, census, local and national statistics offices	Hard copy to be entered into the community database
Health post/hospital	Ministry of Health	Hard copy but with location indicated. Information to be entered into infrastructure database for the each community and the region
Health information (disease incidence, epidemics)	Ministry of Health	Spreadsheet
Schools	Ministry of Education	Hard copy but with location indicated. Information to be entered into infrastructure database for the each community and the region

Data Sources and Formats for Disaster Risk Management Assessments *(cont.)*

Data collected should cover the region and communities in which the assessment is to take place.

Data Set	Likely Source	Format Required
Police stations and government offices	Ministry of Interior and local government.	GIS-useable digital format and hard copies.
Land use	Land use committee, local government, national and local planning offices and Ministry of Forestry.	GIS-useable digital format and hard copies.
Parks, reserves and ecological zones	Ministry of Environment, National environmental committee, Local government.	GIS-useable digital format and hard copies.
Cultural and archeological sites	Ministry of Culture, Universities and local government	GIS-useable digital format and hard copies.
Energy sources and delivery systems (power plants, transmission lines and transformers)	Ministry of Energy, private companies and local government	GIS-useable digital format and hard copies.
Industry/industrial sites (mines, factories etc.)	Local government and Ministry of Industry.	Hard copy, but with location indicated. Information to be entered into infrastructure database for each community and the region
Stockpiles of essential commodities (including information on which items are normally in the stockpile)	Local government and emergency management office	Hard copy, but with location indicated. Information to be entered into infrastructure database for the each community and the region.
Community water supply systems (a description of the water supply systems used by a community)	Local government and Ministry of Water	Hard copy to be entered into the community database.
Electrical infrastructure (including transformers and generating plants)	Local government and electrical company	Hard copy, but with locations indicated. Information to be entered into infrastructure database for the each community in the region.
Distances between communities in region	Local government and Roads Department	Spreadsheet
Transport infrastructure (roads, bridges, airports etc)	Local government, public works, roads department, national and local statistics office	GIS-useable digital format and hard copies. The location of bridges, airports and other critical infra-structure should be noted.
Dams and irrigation systems	Local government, public works and Ministry of Water	GIS-useable digital format and hard copies. The specific location of bridges, airports and other critical infrastructure should be noted.
Communications infrastructure (phones, 2 way radios, radio and TV stations and fiber optics)	Ministry of Communication, police, military and national emergency management agency	GIS-useable digital format and hard copies. The specific location of critical infrastructure should be noted.

Community Selection

It may not be possible to conduct community disaster risk management efforts in all communities in a region due to limited time or resources. It thus becomes necessary to select the communities that are more hazard and disaster prone as targets for the risk management efforts.

This section describes three approaches for selecting communities for community-based disaster risk management activities:

- ***Hazards-based***
- ***Ranking-table***
- ***Metadata.***

The selection of a specific approach is determined by

- Data availability
- The time and resources available for the selection process.

The metadata approach is discussed in more detail as it is the most adaptable to situations where data:

- May be limited
- Of uneven quality and scale
- From qualitative and well as quantitative sources.

Hazards-based Approach

This approach involves a detailed reconnaissance of a region to identify the communities which experience the most significant hazard threats. Hazards which are expected to have greater human and material impact are rated as *more significant* than hazards with lesser impact. Communities are ranked based on the relative significance of the hazard they face in relation to hazards faced in other communities included in the reconnaissance.

The hazard-based approach requires specialists in the physical causes of the hazards, most often geologists, hydrologists and avalanche specialists. The reconnaissance process depends on:

- Having access to all the communities which might be included in risk management efforts
- Being able to spend the time necessary to collect information from government officials and villagers about the past impact of hazards and disasters.

The hazards-based approach faces two limitations. First, the approach requires an intensive time and resource effort which partially duplicates the baseline survey and risk assessment activities of a community disaster risk management assessment. However, if there is already good data on hazards and past impacts, the reconnaissance effort may be an effective way to develop a good understanding of the villages and overall region in which the community-based disaster risk management effort will take place.

The second limitation is the lack of direct consideration of societal issues, as the reconnaissance focuses on the physical processes leading to hazards and disasters. This is a significant limitation, but one which can be partially overcome by adding a community mobilizer to the reconnaissance team.

Ranking-table Approach

This approach is appropriate for situations where a relatively good quantity of quality data is available on the communities in the target regions. Data needed for this approach includes village-level information on:

- Hazard locations
- Historical hazard impacts
- Social and economic conditions
- Past relief and developmental assistance.

The ranking table is constructed, usually in the form of a spreadsheet, with data categories across the top and villages to be considered for inclusion down the left side. Data corresponding to each category is added to the sheet for each village. Once all the data has been added, analysis is performed.

A common analysis approach involves *weighting* and *summing* data for each village. This process involves adjusting the datum for each category and village by a weighting factor to indicate the relative importance of the datum in determining the overall suitability of a village for selection. However, for this type of analysis to be correct, all the data must be converted into the same base standard, for example, monetary value.

The basis for weighting data should be:

- Well researched
- Derive from a process which can be repeated by individuals not directly involved in the selection process
- Be documented in sufficient detail so that it can be reviewed and adjusted in future assessments

In general, the ranking table approach should only be used when good, comparable data sets are available for all villages under consideration.

Metadata Approach

This approach considers all the available data, quantitative as well as qualitative, in a consensus-based strategy to select villages. The metadata approach is best used when:

- Time and resources are not sufficient to collect extensive baseline data on hazards, infrastructure, social and economic conditions, but,
- There is a good range of data sets (generally more than 10) covering the villages to be assessed and,
- A majority of the persons conducting the assessment are familiar with the area where the villages are located.

FOCUS used a metadata approach for the third phase of their work in GBAO. They already had considerable data on villages, but not all data sets covered every village. Some data was qualitative and difficult to combine with quantitative data sets which made the ranking table approach a challenge.

The metadata approach involves four steps described below. In general, the approach is less complex than the ranking table approach, more comprehensive than the hazard-based approach and requires a similar level of effort as either of the other approaches.

Step One – Define village selection criteria.

The village selection team should establish general criteria on which to base village selection. Selection criteria can be based on specific numbers ("village should have more than five hazards"), but also include more general terms ("village is frequently affected by disaster").

At the beginning of the processs, 10 to 12 criteria should be selected which best represent the ideal village for community disaster risk management activities. These criteria should reflect the data which will be available in the metadata sets.

Step Two – Assemble metadata sets

Assembling metadata sets is done by collecting all the available data on villages in the target area into similar sets of data. These sets can be defined in the following ways:

Indicative data, such as the presence of hazards in a village:

Village	Number of hazard areas in village				
	Landslides	Flooded areas in village	Rock falls	Avalanches	Mud slides
Wadabad	1	1	3	2	7
Tagande	0	1	4	3	1
Adorebad	4	0	7	7	2
Harazad	1	0	1	1	4
Tippytoo	9	0	0	1	2

Quantitative data, such as the population statistics of a village:

Village	Village demographics				
	Population	Male	Female	Over 60 years	Under 5 years
Wadabad	316	108	208	69	90
Tagande	286	93	193	74	100
Adorebad	176	38	138	56	57
Harazad	482	191	291	183	150
Tippytoo	296	98	198	97	101

Narrative information, such as text from a field report describing a village in terms of hazard impact, vulnerabilities and risk:

> *'Only one access road, no communication, most men have migrated. The village is highly at risk of debris flows and most houses are threatened each year. Flooding occurs from May to June with damaging floods approximately once in three years.'*

Step Three – Analysis

The analysis process focuses on changing statistical data into averages, ratios or other simple methods of combining two or more data sets. For instance, demographic data can be processed to indicate the percentage of population groups in a village.

For example, the following table sets out the male-to-female ratio and percentage of young and old in a village based on demographic data. (These ratios are often used as proxy indicators of overall vulnerability.)

Step Four – Consensus Selection

This analysis process should be kept simple. It should focus on aiding those involved in the selection of villages to understand the importance of various data sets as they relate to the village selection criteria.

Analysis of population data							
Village	**Village demographics**						
	Population	Male	Female	Over 60 years	Under 5 years	Percentage female	Percentage old and young
Wadabad	316	108	208	69	90	66%	50%
Tagande	286	93	193	74	100	67%	61%
Adorebad	176	38	138	56	57	79%	65%
Harazad	482	191	291	183	150	60%	69%
Tippytoo	296	98	198	97	101	67%	67%

Once the metadata sets have been assembled and analysis performed, the resulting information is reviewed and discussed by the village selection team. The following table provides a simple example of metadata sets (indicative and analyzed data) which can be reviewed by the village selection team.

Note that all data and analysis should be checked for accuracy before the consensus review begins.

Village	Total Hazards	Narrative Comments	Population	Percentage female	Percentage old/young
Wadabad	14	Frequently flooded, inaccessible in winter.	316	66%	50%
Tagande	9	Better off than most villages. Disasters occur every 4-5 years.	286	67%	61%
Adorebad	20	Avalanches cut off village in winter. Work burden on women is high. Food often limited in mid and late winter.	176	79%	65%
Harazad	7	Mud slides in autumn, but not many houses affected.	482	60%	69%
Tippytoo	12	Landslides a long term problem. Village does not consider itself at serious risk.	296	67%	67%

Discussions on village selection are guided by the original selection criteria, but should take into account information which may not have been available at the start of the selection process. These discussions:

- May occur over several sessions
- Should involve individuals familiar with the villages under consideration.

In the end, the objective is to select villages which most closely match the original selection criteria. In most cases, there will not be any perfect match and the expert judgment of the team as a whole will be key in the selection process.

The final list of villages should be reviewed by someone independent from the selection process to ensure that any obvious biases are identified and corrected. This list should also be reviewed with the government authorities and other NGOs working in the target region to avoid duplication or conflicting priorities. Once the final list of selected villages has been established, efforts turn to the *Community Disaster Risk Management Baseline Survey.*

Data Entry Description – Hazard Impact Assessment Spread Sheet

Item	Description and Source
Hazard type	Type of hazard for which calculations are being made.
Site ID	The Hazard Site Number from the ***Hazard Characterization form***, Worksheet 1.
Scenario ID	Scenario number used from Worksheet 4.
Severity factor	Scale of .25 to 1. The classification of intensity is incorporated into the ***Hazard Characterization*** form. The scoring of intensity ratings is taken from each form. See below for a description of the Severity Factor rating scale.
Area affected (hectares)	Area affected by the hazard, in hectares, from Worksheet 7.1.
Frequency (per year)	From Worksheet 3. Frequency is calculated based on how often an event occurs, as indicated in the "Date" data item at the bottom of Worksheet 3.
At-risk elements	From Worksheet 4
Number of elements at risk	From Worksheet 4, for each element.
Structural vulnerability score	Worksheet 5, "Score".
Number of persons exposed	From Worksheet 4, under "Vulnerable Groups: Total People Affected…"
Vulnerable persons exposed	From Worksheet 4: Number of Individuals in Vulnerable Groups of Total Populations.
Occupancy factor	A calculation based on qualitative assessment data. *See Occupancy, below.*
Monetary value of physical elements at risk	From Worksheet 4 for each element at risk.
Vulnerable persons at risk of being affected	Frequency **x** vulnerable persons exposed x severity index **x** occupancy factor. ***See below for a description of the "Severity Factor".*** Expressed as number of vulnerable persons who may be affected per year per hazard location**.**
Total persons at risk of being affected	Frequency x total number of persons exposed x severity index x occupancy factor. Expressed as number of vulnerable persons who may be affected per year per hazard location. ***See below for a description of the "Severity Factor".***
Economic damage (monetary value)	Frequency **x** number of elements at risk **x** severity factor **x** value of element at risk
Economic damage per hectare (monetary value)	Economic damage **x** area affected

Reference is to forms in Annex D. Samples of Hazard Impact Assessment forms are to be found on the CD.

Occupancy refers to how long an individual may be located in the at-risk element, usually a house or building. The calculation is based on:

Hours of occupancy per day ***divided by*** *24* ***multiplied by*** *days of occupancy per year,* ***divided by*** *365.*

Hours of occupancy per day is intended to capture how long a building may be occupied in a day. *Days of occupancy per year* is intended to capture to what degree a building is occupied for less than 365 days per year.

Personnel conducting the field assessment develop estimates of daily and yearly occupancy based on observations and conversations with occupants of the hazard zone being surveyed. This data is entered on the *Quantitative Assessment* worksheet.

Severity Factor Some hazards result in greater, or more severe, impacts than others. This variation is incorporated into the risk assessment by classifying different hazard event intensities into different levels of severity.

A value ranging from 0 to 1 is used to capture the level of severity set out in the *Hazard Characterization* worksheet for each hazard (See sample in Annex D). The following table sets out the severity factor for each of the hazards typically covered in an assessment.

Severity Factor for Descriptive Hazard Intensities *See Hazard Characterization Worksheets for details of levels of intensity*				
Hazard	Description of Hazard Intensity			
Rock fall	extremely big, major	moderate, minor		
Landslide	all intensities			
Flooding		extremely big, major	moderate, minor	
Debris flow	big, major, moderate	minor		
Avalanche	all intensities			
River bank erosion				all intensities
High ground water				all intensities
Severity factor value	1	.75	.5	.25

Maps

A Note on Scale

The optimal scale for mapping a village is between 1:5,000 and 1:10,000. However, it is often difficult to find base maps at this scale.

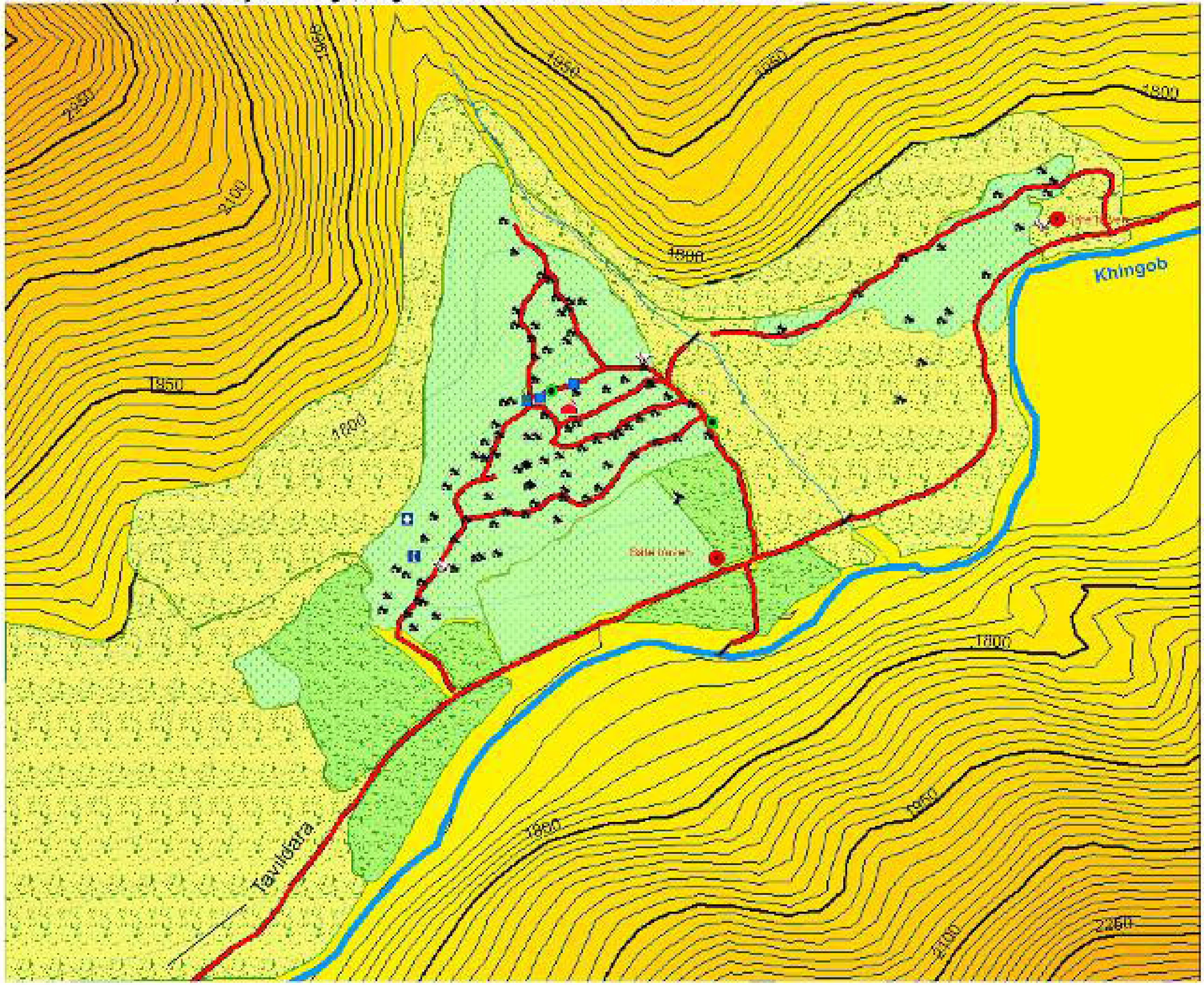
To address this challenge, the GBAO activities digitized available 1:50,000 scale maps of the project area. These maps were "exploded" using Arcview® to an apparent scale of 1:10,000 and printed out for use in field data collection. The field GPS and hard data entered into the GIS was plotted on 1:50,000 scale maps "exploded" to 1:10,000 or larger scale.

The documents produced from "exploded" 1:50,000 scale maps are not maps in a proper sense. The enlargement process significantly reduces the accuracy of the contours and other information on the original 1:50,000 map. However, as the GPS data gathered in the *Baseline Survey* has a known accuracy, the use of larger (more detailed) scales to present this data is acceptable.

The difference between the original base maps and the new maps produced with GPS data clear on the Infrastructure, Hazard and Risk documents. The "exploded" sections are more "fuzzy" than the more accurate GPS-based maps.

The consideration of map scale and the availability of map scales ranging from 1:5,000 to 1:50,000 should be addressed at the start-up of a community disaster management project to avoid later problems with cartography and a misrepresentation of survey results.

Infrastructure Map of Sayod Village, Sagirdasht Jamoat, Darwaz District

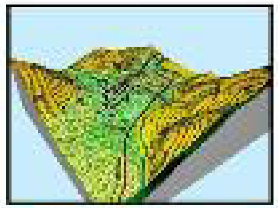


Legend

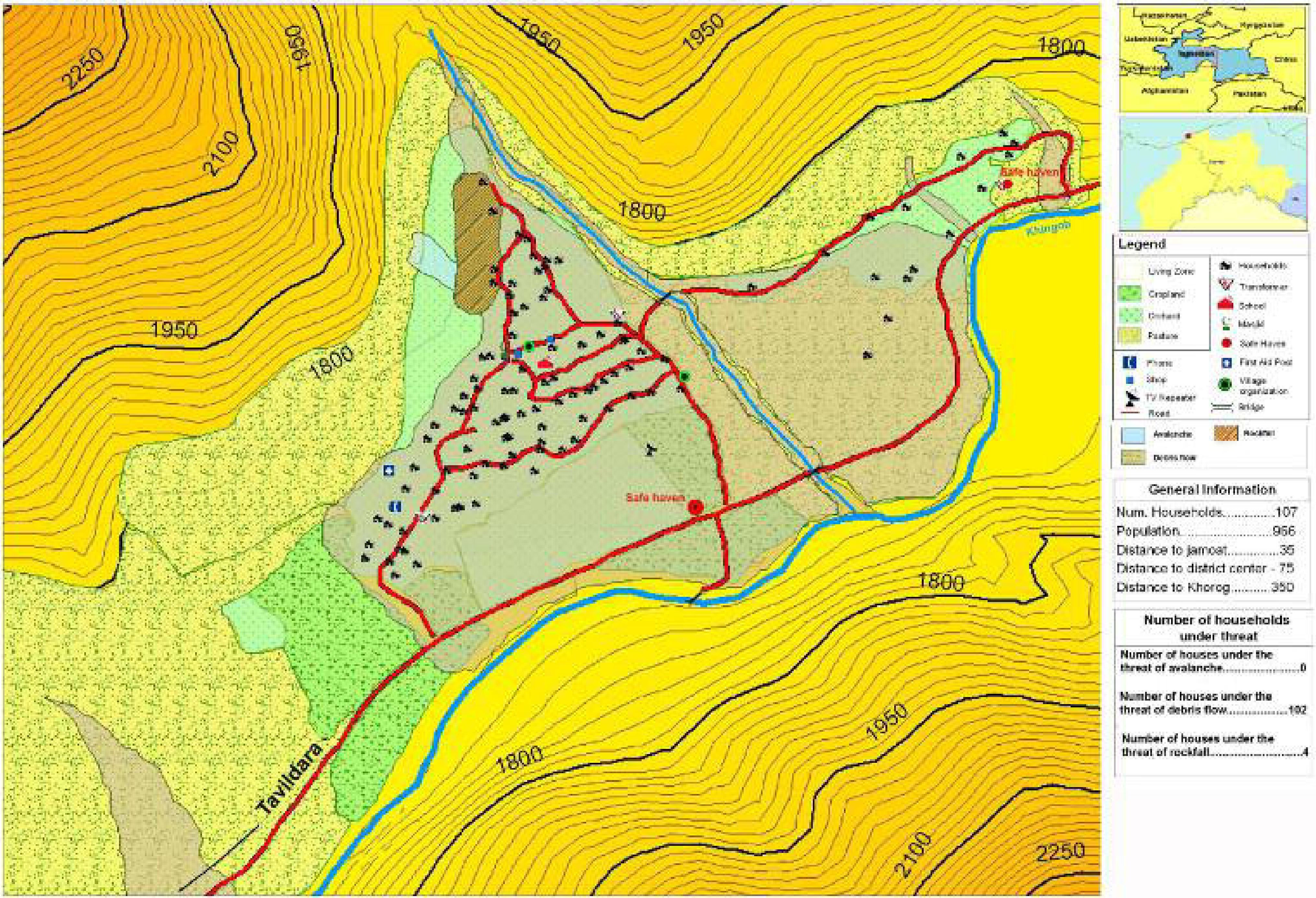
- Living Zone
- Cropland
- Orchard
- Pasture
- Phone
- Shop
- TV Antenna
- Road
- Households
- Transformer
- School
- Masjid
- Safe Haven
- First Aid Post
- Village organization
- Bridge

General Information

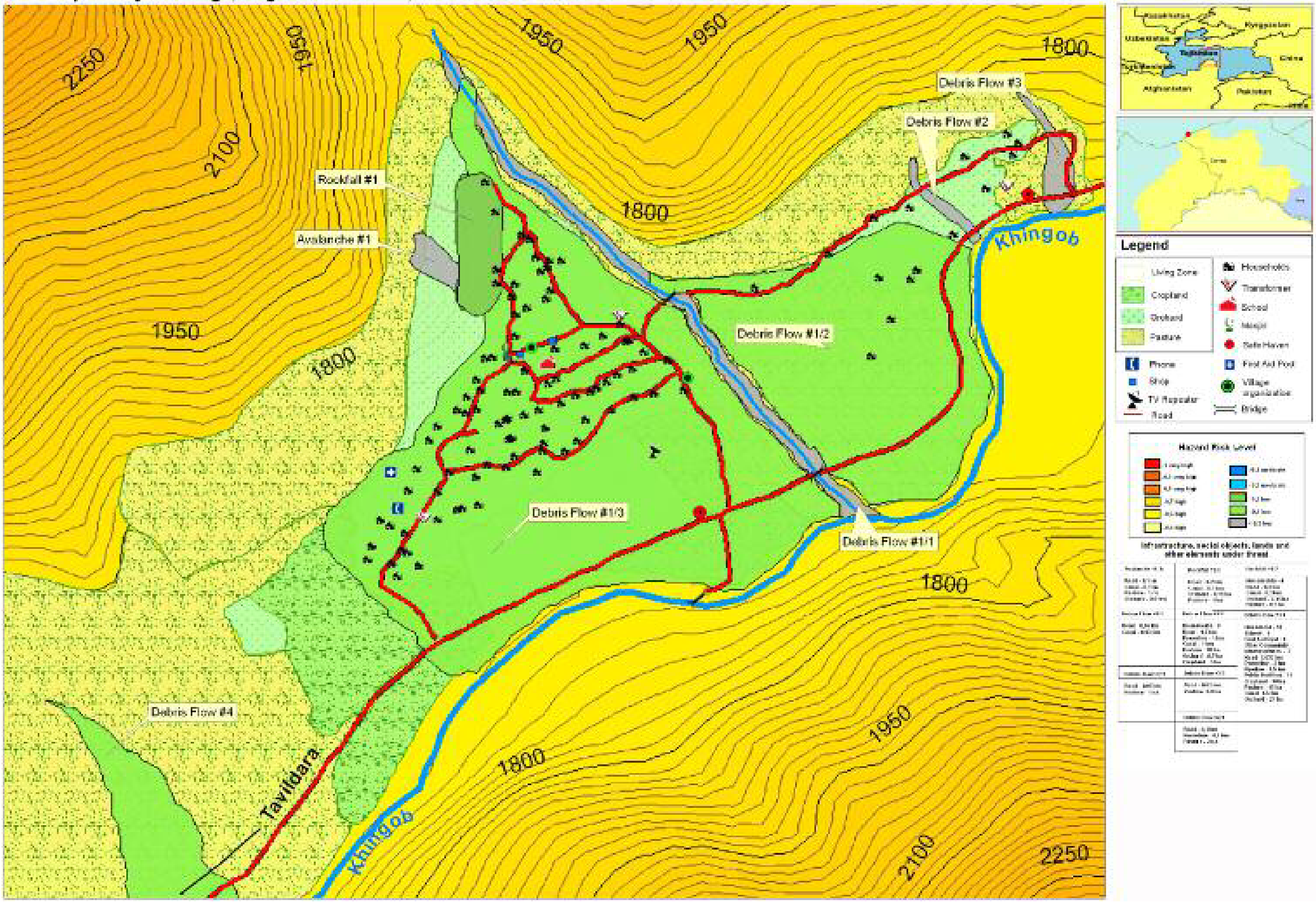
Num. Households............107
Population........................566
Distance to jamoat.............35
Distance to district center - 75
Distance to Khorog..........350



Hazard Map of Sayod Village, Sagirdasht Jamoat, Darwaz District



Risk Map of Sayod Village, Sagirdasht Jamoat, Darwaz District



References

The following list of selected references is intended to assist *Guide* users in gathering further information about various aspects of community disaster risk reduction.

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Disaster Management GIS

A key element of the community based disaster risk management effort undertaken by FOCUS in GBAO has been the development of a geographical information system (GIS) to manage and effectively use the data collected. The result is a Disaster Management GIS (DMGIS), providing a powerful tool for disaster managers, government officials and communities in preparing for and responding to disasters in GBAO. The DMGIS links the risk information, risk knowledge generation and risk knowledge dissemination segments of the Risk Management Strategic Approach.

FOCUS has been collecting data on hazards, infrastructure, social and economic conditions in communities across GBAO since 2003. The resulting database covers some 224 of the 400 plus communities and villages in GBAO. The database contains detailed infrastructure, hazard and risk information and maps developed under the three DIPECHO Projects from 2004 to 2006. Also included is information on roads, airports and other landing areas, major hazard zones outside the communities covered by the three DIPECHO projects and information on past disasters and hydro-metrological conditions in GBAO. The structure of this data base can be found on page 27.

The DMGIS is able to provide disaster management related maps as well as data-based reports. For instance:

- *When reports indicate avalanches have occurred along the Khorog-Dushanbe road, the DMGIS can be used to plot the likely location of these avalanches based on hazard assessments, provide the names and locations of the communities affected, indicate how many people may be affected and indicate where helicopters can land to move rescue teams or supplies to the affected areas.*
- *When flooding is reported, the DMGIS can be used to plot out the areas which might be affected in villages along the river, and provide both maps and tables indicating how many households and infrastructure might be affected. This information aids authorities in damage estimates and planning assistance requirements.*
- *After a major debris flow, GPS receivers can be used to record the exact location of the flow and the location of damaged buildings and other infrastructure. This information, along with detailed damage assessment worksheets, can be assembled into maps and damage tables, for use in damage assessments and recovery planning.*

DMGIS is currently managed by FOCUS staff. However, FOCUS has begun training MoESCD staff to maintain and run the DMGIS so that it can be wholly integrated into local disaster management operations.

A component of the DMGIS is the Incident Reporting System (IRS). IRS is a simple and structured way to enter up-to-date information on disasters and emergencies. This information provides a base for incident reporting, analysis of disaster trends, and updating hazard maps and risk assessments.

The IRS also provides MoESCD GBAO with a structured information source from which reports on a disaster can be generated. The resulting accurate and up-to-date reporting improves MoESCD's ability to manage relief and response operations, as well as mobilize resources from outside the region.

IRS is run on MS Access®. A copy of the program and instruction manual can be found in Annex U. IRS was designed by FOCUS staff, tested with the MoESCD and is fully operational at MoESCD in Khorog.

FOCUS HUMANITARIAN ASSISTANCE



EUROPEAN COMMISSION

Humanitarian Aid

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