GENERAL GUIDELINES
FOR SNOW LEOPARD LANDSCAPE MANAGEMENT PLANNING

ADVICE DOCUMENT ADDENDUM

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Advice Document Addendum to the General Guidelines for Snow Leopard Landscape Management Planning

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Strategic Management Planning in Snow Leopard Landscapes

Advice Document Addendum to the General Guidelines for Climate Smart Snow Leopard Landscape Management Planning

Lead Author: John Morrison, (john.morrison@wwfus.org), WWF, 1250 24th St NW, Washington, DC 20037, USA
Contributing Editors: Nilanga Jayasinghe (nilanga.jayasinghe@wwfus.org), Chris Czarnecki (chris@snowleopard.org)

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1. Background

Strategic planning is the process of defining the overall objectives of a snow leopard landscape management plan, determining the current and desired state of snow leopards and their prey, understanding direct threats to snow leopards and their prey as well as the root causes of those threats and developing measurable interventions. In combination with mapping and field work/research, strategic planning is the core process used to develop a snow leopard landscape management plan.

In the context of GSLEP landscapes, strategic planning concerns the following topics mentioned in the existing guidance framework developed by the Snow Leopard Trust, "*General Guidelines for Snow Leopard Landscape Management Planning*":

- Visions, Goals, Objectives
- Analysis of Threats
- Addressing Threats
- Activities

Other considerations mentioned in the General Guidelines can also be involved in the strategic planning process.

2. Principles of Strategic Management Planning

Below are some key principles of the approach suggested in this document:

- Consult relevant stakeholders who understand the ecology, culture and socioeconomics of the landscape
- Include project staff and stakeholders in the planning effort
- Integrate climate change in the development of the project from the beginning

3. Suggested Planning Process

There are a number of ways to develop a strategic plan. A commonly used framework, and the one suggested in this document, is the Open Standards for the Practice of Conservation [http://cmp-openstandards.org/]. The key steps for developing a climate-smart snow leopard landscape management plan are as follows:

1. Establish the links between the ecosystem services found in snow leopard landscapes and humans
2. Document the current state and desired goals for snow leopards and their prey in the landscape
3. Identify non-climate direct threats to snow leopards and their prey
4. Rate the scope, severity and irreversibility of the non-climate direct threats to snow leopards and their prey
5. Develop a General Model of the Socio-Economic-Ecological System
6. Summarize climate projections in a small number of future scenarios (this work takes expertise and time - it needs to begin before the actual planning can begin)

7. Identify likely climate-related impacts to snow leopards and their prey, as well as understanding how humans will be affected and how they consequently may affect snow leopards and their prey
8. Add the most important climate impacts back into the General Socio-Economic-Ecological model
9. Brainstorm interventions that could improve the situation
10. Use the climate scenarios to filter the potential interventions
11. Show the logic of the selected strategies, including the activities that will lead to beneficial outcomes

3.1 Establish the links between the ecosystem services found in snow leopard landscapes and humans

This step usually involves developing a diagram that shows how snow leopards and their prey are linked to human well-being via ecosystem services. This diagram (Figure 1) shows an example:

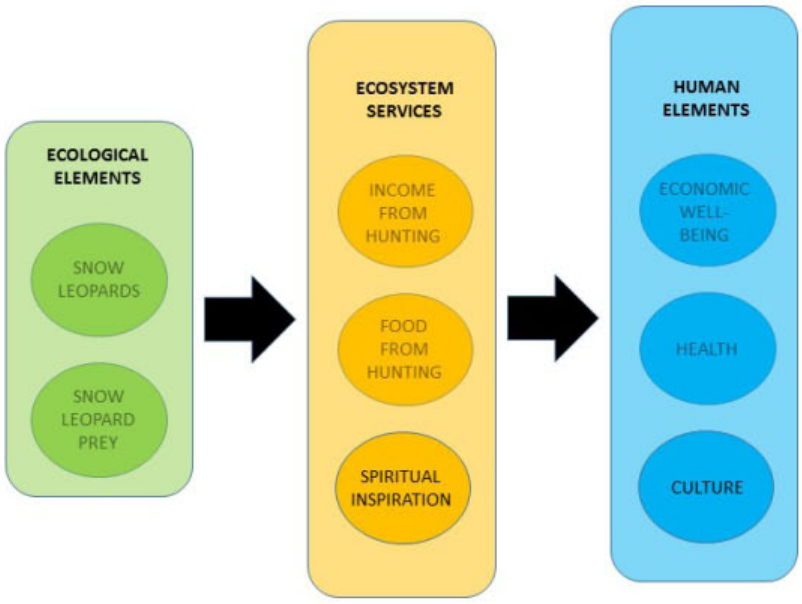

Figure 1. A representation of the relationships between snow leopards, their prey, specific ecosystem services and specific elements of human well-being.

3.2 Document the current state and desired goals for snow leopards and their prey in the landscape

This step is about documenting and understanding the current status of snow leopards and their prey species in the landscape, and what the goals are for the future. The status of snow leopards and their prey get broken down into key components with associated indicators and ratings, such as Very Good, Good, Fair or Poor. The rating explanations are as follows, which helps put the status numbers in context:

- **Very Good**
  - Desirable status

    - Requires little intervention to maintain
- **Good**
    - Within acceptable range of variation
    - Some intervention required to maintain
- **Fair**
    - Outside acceptable range of variation
    - Requires considerable human intervention to maintain
- **Poor**
    - Restoration increasingly difficult
    - May result in extirpation of snow leopards or their prey

Typically, a table, such as the one below, is a good way to list your ratings (Table 1); it should be customized and adapted to reflect the species and situation in each respective snow leopard landscape.

Snow Leopard Viability Rating Table						
Component	**Indicator**	**Current State**	**Current Rating**	**Desired State**	**Current Rating**	**Notes**
Total Population of Snow Leopards	Number of individuals	320	Good	500	Very Good	Current data is from 2015 field surveys by (*Smith et al.*)
Occupancy of historic range	% of historic range occupied by snow leopards	60%	Fair	85%	Good	GIS data is maintained by Wildlife Agency

Snow Leopard Prey Viability Rating Table						
Component	**Indicator**	**Current State**	**Current Rating**	**Desired State**	**Current Rating**	**Notes**
Total Population of Siberian Ibex	Number of individuals	1,500	Fair	3,500	Very Good	Current data is from 2015 field surveys by (*Smith et al.*)

Table 1. Example of a Viability Rating Table.

3.3 Identify non-climate direct threats to snow leopards and their prey

This step is about identifying the conventional, non-climate threats to snow leopards and their prey. A threat is defined as an action taken by humans that is directly and negatively affecting snow leopards and their prey. Examples of threats include:

- Poaching
- Retaliatory Killing
- Overgrazing by Livestock
- Human Disturbance
- Etc.

3.4 Rate the scope, severity and irreversibility of the non-climate direct threats to snow leopards and their prey

The next step involves an objective rating of the conventional, non-climate direct threats. This rating is usually done in a table format (Table 2).

Snow Leopard & Snow Leopard Prey Threat Rating Table								
Threats	**Snow Leopard**				**Snow Leopard Prey**			
	Scope	**Severity**	**Irreversibility**	**Overall**	**Scope**	**Severity**	**Irreversibility**	**Overall**
Poaching	High	High	Medium	Medium	High	High	Medium	Medium
Retaliatory Killing	Low	High	Low	Low	-	-	-	-
Overgrazing by Livestock	-	-	-	-	High	Medium	Low	Low
Human Disturbance	Low	Low	Low	Low	Medium	Medium	Low	Low
Etc.								

Table 2. Example of a Threat Ranking Table.

The rating criteria follow below:

Scope - Most commonly defined spatially as the proportion of the snow leopard (or prey) population that can reasonably be expected to be affected by the threat within ten years given the continuation of current circumstances and trends.

- ***Very High***: The threat is likely to be pervasive in its scope, affecting the target across all or most (71-100%) of its occurrence/population.
- ***High***: The threat is likely to be widespread in its scope, affecting the target across much (31-70%) of its occurrence/population.
- ***Medium***: The threat is likely to be restricted in its scope, affecting the target across some (11-30%) of its occurrence/population.
- ***Low***: The threat is likely to be very narrow in its scope, affecting the target across a small proportion (1-10%) of its occurrence/population.

Severity - Within the scope, the level of damage to the snow leopard (or prey) population from the threat that can reasonably be expected given the continuation of current circumstances and trends.

- ***Very High***: Within the scope, the threat is likely to destroy or eliminate the target, or reduce its population by 71-100% within ten years or three generations.
- ***High***: Within the scope, the threat is likely to seriously degrade/reduce the target or reduce its population by 31-70% within ten years or three generations.
- ***Medium***: Within the scope, the threat is likely to moderately degrade/reduce the target or reduce its population by 11-30% within ten years or three generations.

- ***Low***: Within the scope, the threat is likely to only slightly degrade/reduce the target or reduce its population by 1-10% within ten years or three generations.

Irreversibility (Permanence) - The degree to which the effects of a threat can be reversed and the snow leopard (or prey) restored.

- ***Very High***: The effects of the threat cannot be reversed and it is very unlikely the target can be restored, and/or it would take more than 100 years to achieve this (e.g. wetlands converted to a shopping centre).
- ***High***: The effects of the threat can technically be reversed and the target restored, but it is not practically affordable and/or it would take 21-100 years to achieve this (e.g. wetland converted to agriculture).
- ***Medium***: The effects of the threat can be reversed and the target restored with a reasonable commitment of resources and/or within 6-20 years (e.g. ditching and draining of wetland).
- ***Low***: The effects of the threat are easily reversible and the target can be easily restored at a relatively low cost and/or within 0-5 years (e.g. off-road vehicles trespassing in wetland).

Threat Scoring Matrices

The following two matrices show how Severity and Scope are combined to create a Threat Magnitude rank (Table 3), which is then combined with the Irreversibility Rank to deliver an Overall Threat Rank (Table 4).

		Scope			
		4-Very High	3-High	2-Medium	1-Low
Severity	4-Very High	4-Very High	3-High	2-Medium	1-Low
	3-High	3-High	3-High	2-Medium	1-Low
	2-Medium	2-Medium	2-Medium	2-Medium	1-Low
	1-Low	1-Low	1-Low	1-Low	1-Low

Table 3. Example of a Threat Magnitude Rank.

The **Overall Threat Rank** is calculated by integrating **Threat Magnitude** and a third rating variable (in this case **Irreversibility**):

		Irreversibility			
		4-Very High	3-High	2-Medium	1-Low
	4-Very High	4-Very High	4-Very High	4-Very High	3-High

Magnitude	3-High	4-Very High	3-High	3-High	2-Medium
	2-Medium	3-High	2-Medium	2-Medium	1-Low
	1-Low	2-Medium	1-Low	1-Low	1-Low

Table 4. Example of an Overall Threat Rank.

3.5 Develop a General Model of the Socio-Economic-Ecological System

This step involves creating a box and arrow diagram that summarizes everything the management team knows about how snow leopards and their prey are threatened, and the drivers behind those threats. Initially, the diagram might look something like Figure 2 (below). Once the information is organized and recreated on a computer, it should look more like Figure 3 (below).

Figure 2. Socio-Economic-Ecological System Diagram (hand-drawn)

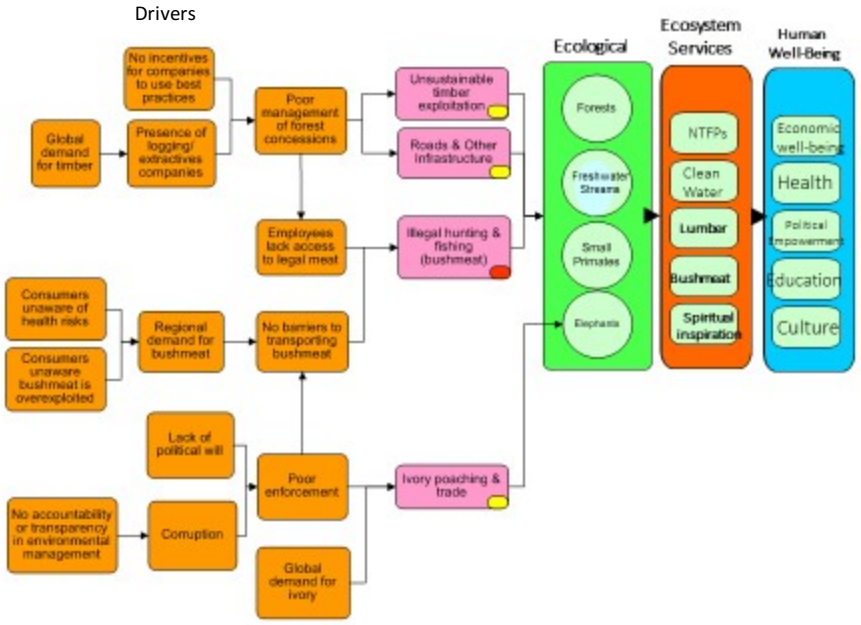

Figure 3. Socio-Economic-Ecological System Diagram (computer generated)

3.6 Summarize climate projections in a small number of future scenarios (this work takes expertise and time - it needs to begin before the actual planning can begin)

This step should happen before the main planning group assembles, and is undertaken by the facilitator and a climate modeling expert. Climate scenario planning is useful because it:

- helps us identify adaptation strategies that will work across multiple scenarios
- helps us identify adaptation strategies that will not work in multiple scenarios
- allows us to think of contingency plans for scenarios that look unlikely but are possible
- in short, scenario planning helps us manage uncertainty

Building the climate scenarios consists of a few sub-steps:

1. Construct a “local” climate calendar (Figure 4)
2. Run a full suite (20-30) of global circulation models out to ~2050
3. Look for parameters where the models all agree
4. Look for parameters where the models are different (e.g., summer temperature, fall precipitation)
5. Among the parameters where there is uncertainty (differences between models), choose 2+ parameters. These parameters become the scenario axes. The resulting scenarios are seen in Figure 5.

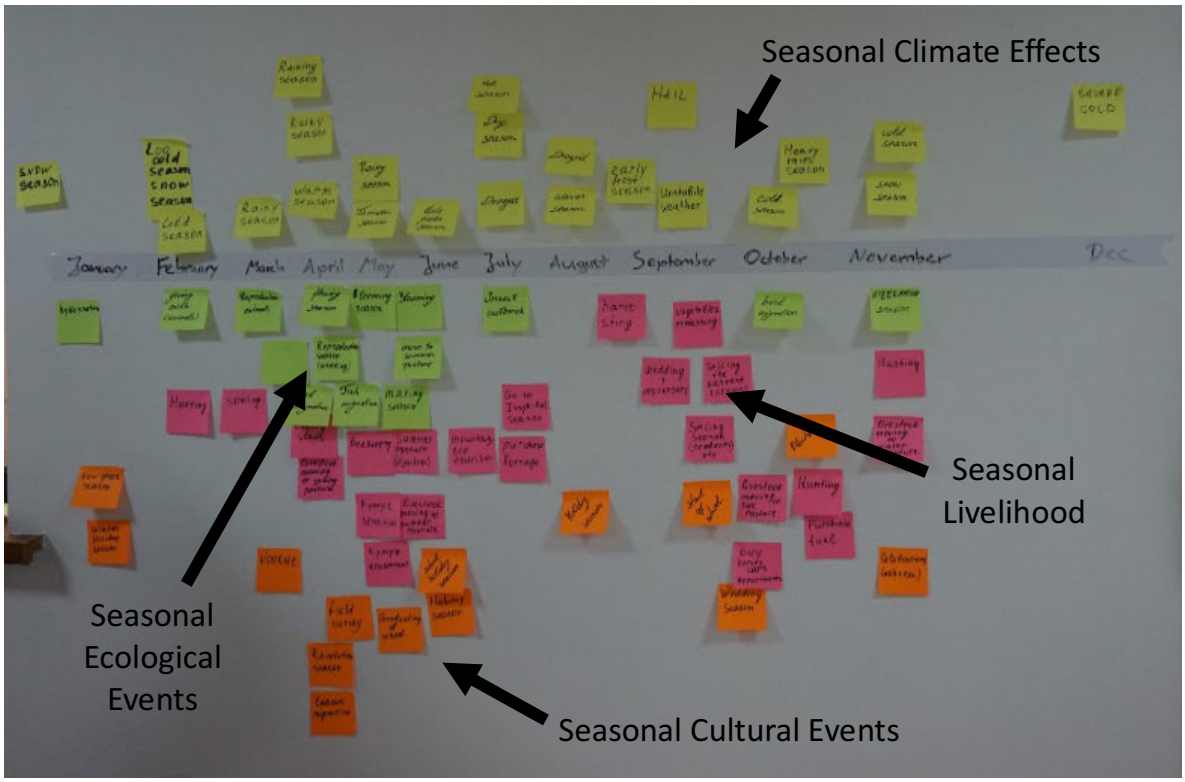

Figure 4. Local Climate Calendar

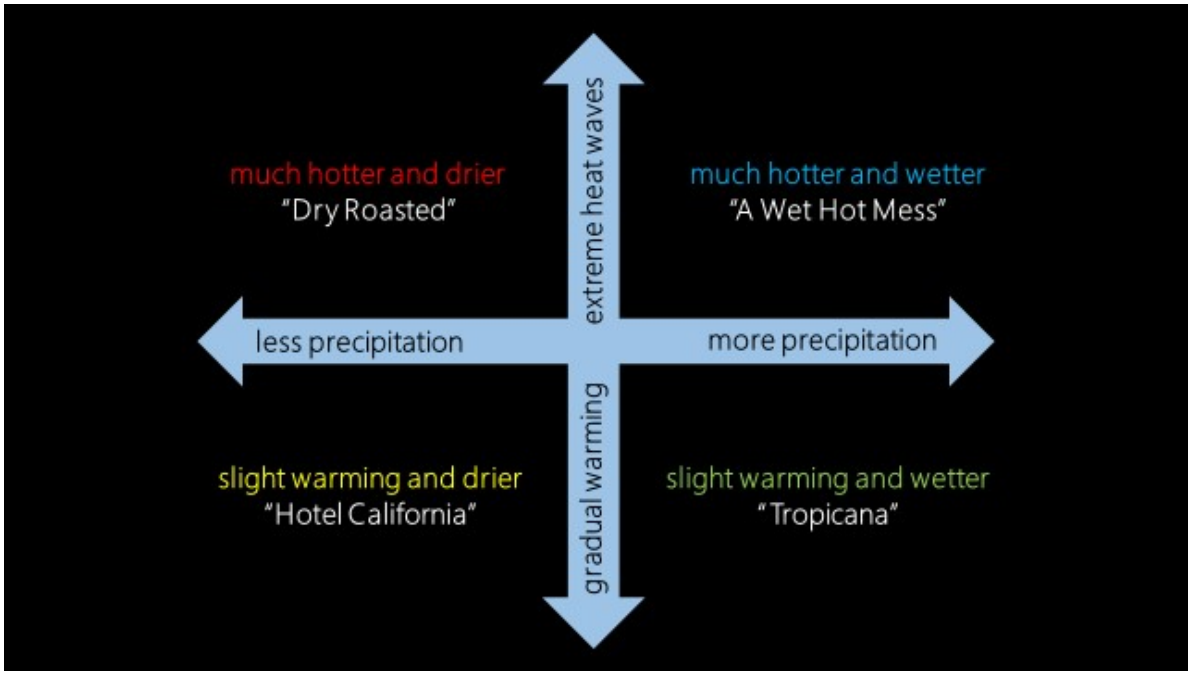

Figure 5. Climate Change Scenarios

3.7 Identify likely climate-related impacts to snow leopards and their prey

This step involves considering the impacts of each climate scenario individually on snow leopards, their prey and the wider snow leopard landscape, including human activities, in order to understand the full range of potential impacts. A device called an “ecological drawing” is often used to begin discussing these impacts (Figure 6).

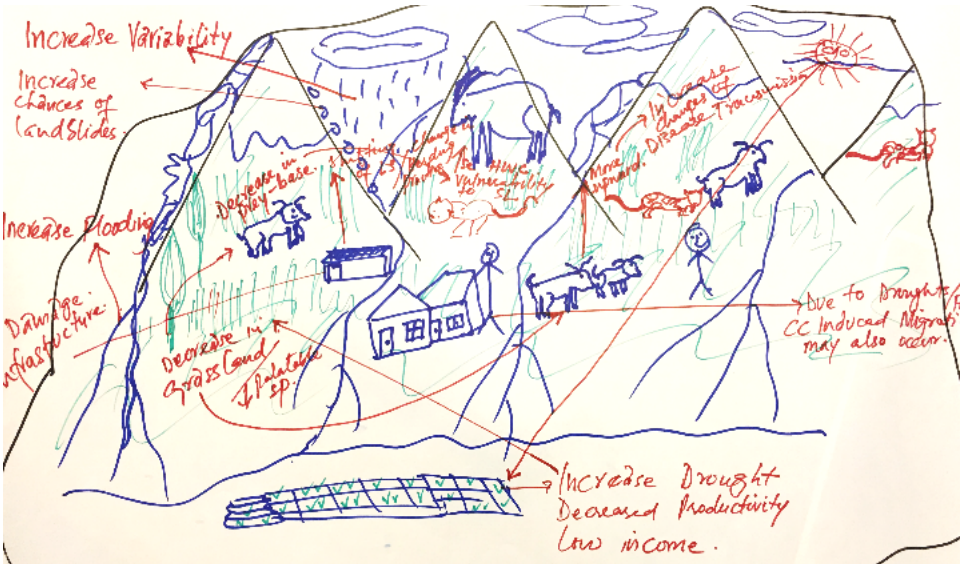

Figure 6. Ecological Drawing

Don’t forget to include the impacts of human reactions to climate change. When the impacts are summarized for all four scenarios, the result will look like Figure 7.

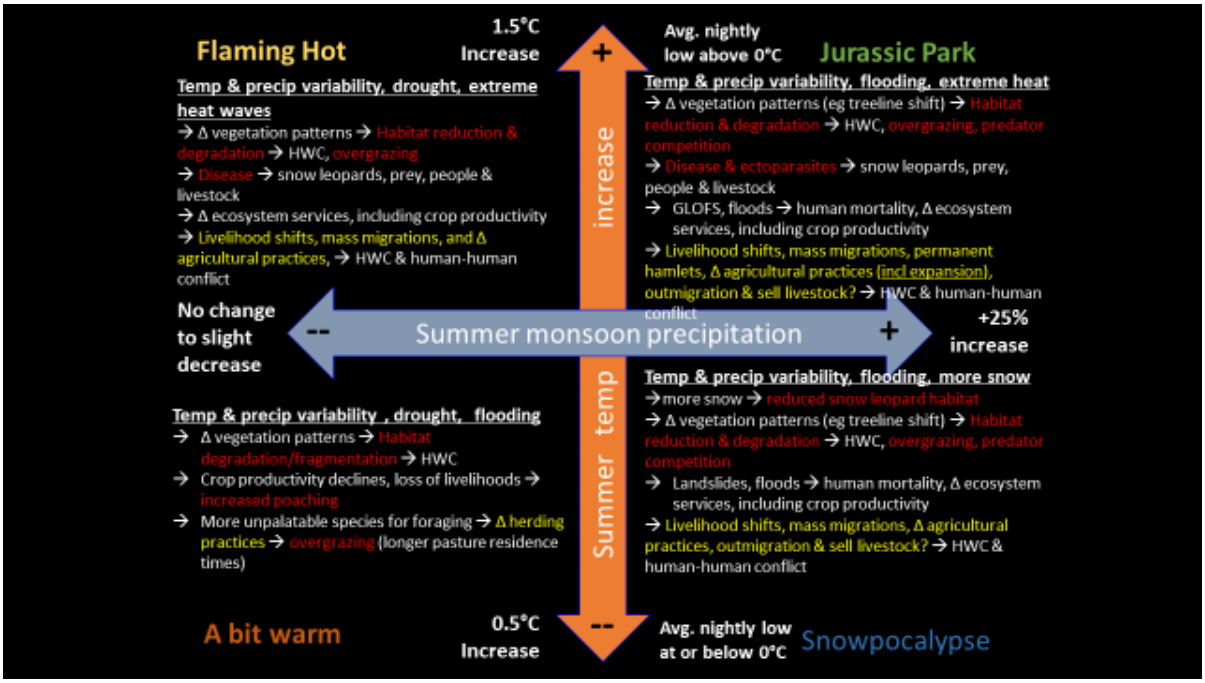

Figure 7. Climate Change Scenarios and Impacts

3.8 Add the most important climate impacts back into the General Socio-Economic-Ecological model

This step is tricky, and involves teasing out the climate impacts that are most severe, whether they are directly from climate or a result of human reactions to climate, and inserting them appropriately in the model (Figure 8).

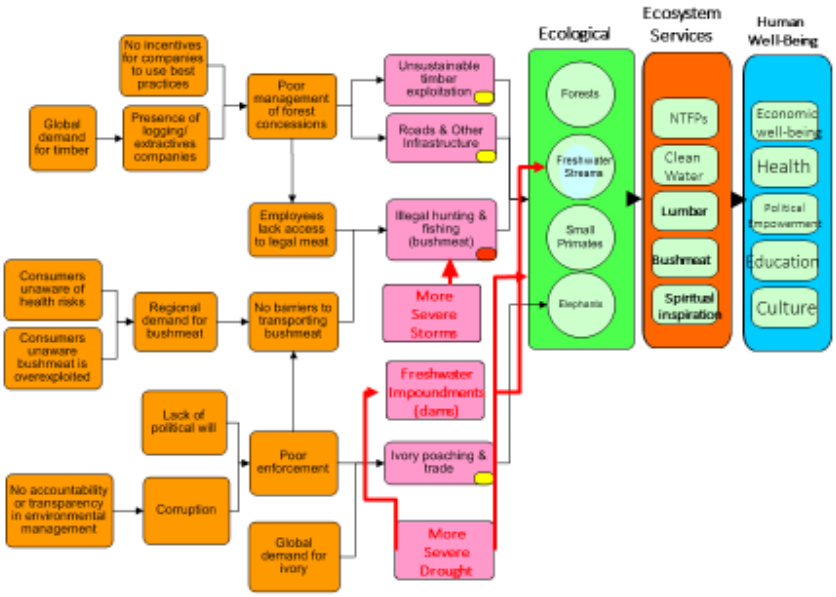

Figure 8. Incorporating Climate Impacts into the General Socio-Economic-Ecological model

3.9 Brainstorm interventions that could improve the situation

This step involves using the comprehensive model that has been created as a map to think about all of the possible solutions to the issues. No idea should be dismissed until it has been thoroughly discussed.

3.10 Use the climate scenarios to filter the potential interventions

Evaluate potential solutions next – by cost, technical feasibility, potential effectiveness, and especially whether each solution will be useful in all of the climate scenarios explored earlier. If a strategy may not work in one or more of the possible future climate scenarios, then further discussion should take place about whether it is a good idea to invest in. A simple table such as the one below (Table 5) may help:

Strategies	Strategy Selection Criteria					
	Impact	**Cost**	**Feasibility**	**Work in all Climate Scenarios?**		

Table 5. Strategy Selection Table

3.11 Show the logic of the selected strategies (including the activities that will lead to beneficial outcomes)

This step is an extremely important and helpful step that can benefit any conservation project: laying out the logic, or "theory of change" of the strategy, so that it is clear, even to latecomers, how the strategy is supposed to work. It also allows the strategy to be tracked (is it working the way it was intended?), and modified as necessary.

The tool most often used to accomplish this task is called a "results chain" (Figure 9) – a chain of results mixed with activities.

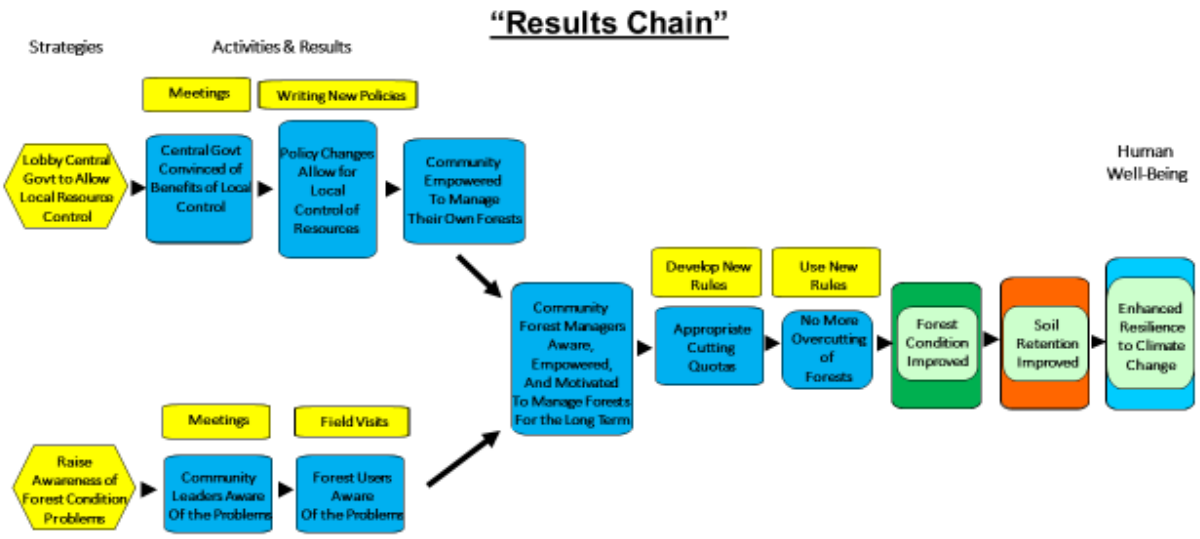

Figure 9. Results Chain

This is a brief overview of a suggested method for planning for the conservation of a snow leopard landscape, a protected area or any other conservation object. After these steps have been completed, a team should be able to turn the products into a management plan document.

4. Key Resources

- Trained Open Standards Coaches: Having a trained "coach" – a facilitator who knows the method, will always be helpful.
- The Open Standards for the Practice of Conservation: The basic planning framework. [http://cmp-openstandards.org/]
- Conservation Coaches Network: A global network of facilitators with training to lead Open Standards processes. [www.ccnetglobal.com]
- Miradi: Adaptive management software for conservation projects. An optional piece of software built to support the Open Standards planning process. [www.miradi.org]

5. Trained Open Standards Coaches

John Morrison is an experienced coach from the Conservation Coaches Network (CCNet) who can either help you directly or help find someone who can assist.
john.morrison@wwfus.org

Additional Trained Coaches:

Yiting Wang,
Program Development Officer, WWF China
ytwang@wwfchina.org

Jin Tong
TNC China
jtong@tnc.org

Munkhnast Dalannast
WWF Mongolia
munkhnast@wwf.panda.org

Adam Barlow
South Asia CCNET Franchise Lead (India, Nepal, Bhutan), Wildteam
adam@wild-team.org

Coaches who act as Consultants:

Nick Salafsky
Foundations of Success
nick@fosonline.org

Rob Sutter
Enduring Conservation
rsutter@enduringconservation.com

Quinn Shurtliff
qshurtliff@gssif.com

Participation in Conservation

Advice Document Addendum to the General Guidelines for Climate Smart Snow Leopard Landscape Management Planning

Lead Author: Yash Veer Bhatnagar, PhD, (yash@ncf-india.org), Nature Conservation Foundation/Snow Leopard Trust, WWF, 3076/5 IV Cross, Gokulam Park, Mysuru, 570020, India
Contributing Editors: Nilanga Jayasinghe (nilanga.jayasinghe@wwfus.org), Chris Czarnecki (chris@snowleopard.org)

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1. Background

In this Advice Document, we hope to highlight the importance of using participatory approaches for snow leopard conservation, particularly for landscape level management planning. We introduce some of the principles and tools for enabling such planning, steps for stakeholder engagement, and provide suitable links and resources for exploring these approaches. This document is not prepared as a manual for participatory conservation, for which some suitable references are provided at the end.

Participation is the act of taking part in an activity of event (Oxford Advanced Learner's Dictionary 2000). A participatory approach to conservation, is thus '…a process through which stakeholders influence and share control over … initiatives and the decisions and resources which affect them" (The World Bank 1996)', Until a few decades ago, the conservation movement followed highly protectionist and top-down models of conservation based on exclusionary Protected Areas (PA). While these models did work in some places, they often served to further marginalize low-income communities that depend on natural resources in developing countries. Thus, conservation and development agencies took initiatives in the late 1980s to understand stakeholder dependencies and promote sustainable development models with local participation in conservation and development (Chambers 2007). This model has also received substantial momentum with developmental agencies often insisting on participation when funding projects.

Photo 1. A snow leopard looks into a camera trap in China's Sanjiangyuan National Nature Reserve in Qinghai province. Photo Credit: Shan Shui / Panthera / Snow Leopard Trust

Recognizing the importance of participatory approaches the 'Bishkek Declaration' [http://www.worldbank.org/content/dam/Worldbank/document/eca/Bishkek-Declaration-on-the-Conservation-of-Snow-Leopards.pdf] signed by the leaders of the twelve snow leopard range countries under the Global Snow Leopard Ecosystem Protection program states that all countries:

"Understand that the conservation of the snow leopard must be achieved by securing the involvement, livelihoods, and balanced development of human communities who share the habitat, striving to reconcile the conflict between economic growth and environmental sustainability"

It further resolves to work together to:

"*Enhance the role of local communities in snow leopard conservation efforts by adopting and implementing policies and laws that favour the involvement of such communities as stewards of biodiversity and champions of conservation.*

and,

Ensure that industry, mining, infrastructure, and rural development programs and projects are fully sensitive to the conservation needs of snow leopards and their ecosystems, do not adversely affect or fragment key populations or critical habitats, and employ wildlife-friendly design, offsets, and other mitigation tools…."

The snow leopard is a species that is spread over large landscapes, often occurring far beyond PAs, in areas managed by communities, companies or Government agencies. There are, thus, numerous stakeholders in any snow leopard landscape with traditional or legal rights. With different stakeholders, the perceptions, interests, needs and expectations towards conservation and development can differ substantially.

Example: A valley adjacent to a protected area, has good snow leopard and prey population, and has high values for ecosystem services. It may have a few villages with agriculture, some pastures and areas for fuel collection. A village from an adjacent valley claims most of the pastures. Further, there is the animal husbandry department that comes with a mandate for tripling sheep production in a few years; a horticulture department that wants to convert a large patch of moist meadow by the stream into an apple plantation; a tourism department that wishes to create a large camping site near the pastures, and so on.

Photo 2. The Ukok Plateau natural park, Republic of Altai, provides critical habitat for the snow leopard and many other endangered species. © Denis Bogomolov / WWF-Russia

It may be clear that with all these activities or some such as intense tourism the valley's, value for snow leopard may diminish. Conservation, livelihood and human welfare concerns are often intertwined closely. Therefore, conservation and management initiatives will need to include all perspectives and plans that are sensitive to other concerns, yet are managed to secure wildlife in the area. This will require sustained dialogue with stakeholders with disparate interests in order to come up with solutions.

Participatory conservation is, thus, a means of using local insights and inputs and developing consensus to take up activities with local people and agencies to sustain conservation interventions over time.

2. Principles of Participation

Some key principles for this process (excerpted and modified from Pretty et al. (1995) and TMI (2000)) are:

- *Multiple perspectives*: Like mentioned above, a typical landscape has stakeholders such as local communities, government departments, NGOs, community based organizations for profit companies, all of whom are likely to see the land and its resources with differing views and expectations. Further, the community, too, is not a monolith, but may have differing ways of using the landscape. This principle recognizes the fact that different stakeholder groups make different assessments of situations leading to different expectations and actions regarding conservation and development.
- *A defined set of methods and systematic learning process*: The focus is on cumulative learning by all participants, including facilitators, trainees and local people. All participants have something to offer and learn based on their own knowledge, beliefs and perceptions. Participatory Learning and Action (PLA) tools often help in these assessments (see below).
- *Facilitator attitudes and skill*: This is critical, as the facilitator should try to maintain an unbiased and appreciative sense of enquiry. The facilitator should ideally ensure equity, fairness and transparency in the discussions and agreed actions. The facilitator should help people carry out their own learning to achieve goals and objectives.
- *Consensus on issues and actions*: Actionable points need to emerge from discussion and debate that help in resolving the conservation issue(s) under consideration. Action plans need to be prepared that help clarify the issue, the activity to address it, who will do what and when. How partners will pool the resources is an important step. Incorporate co-financing in cash or kind by partners for implementation of the plans. This can often enhance sense of ownership and helps in making the implementation of works more cost effective.
- *Local institution building and capacity building*: Activities should be taken up that lead to leadership, enhanced local capacity and structures to sustain these activities (see Addendum 4. Integrated Management and Governance).

Further, it should be noted that when sustainable management of the landscape is the primary goal, facilitators should be aware of that from the onset of the process. Community development can be addressed, but ensure that conservation and ecosystem management linkages are closely integrated and maintained for a holistic, sustainable approach. In some cases, strategic interventions in the areas of health, education, livelihoods and local infrastructure may need to be made initially to address urgent needs of communities, as well as build trust engagement. These are sometimes referred to as 'entry point activities' that can, at a later stage, even continue along with conservation activities. For example, if a community is seasonally cut off for want of a small bridge, it is difficult to engage with them straight

away on a conservation issue. It may be good to consider a participatory process, to first jointly build this bridge and then begin engagement on the conservation issue.

3. Stakeholder Analysis

Before determining how the various stakeholders in a snow leopard landscape will participate in conservation and the landscape management planning efforts, they must first be identified, and an initial analysis should take place to determine areas of convergence and divergence with snow leopard conservation goals. A stakeholder is an individual, group or institution that has an interest in or is impacted by a project. Stakeholders, particularly influential ones such as government departments or industries, can play a decisive role in how a landscape is managed. Most of these agencies are active in the landscape due to long-standing and legitimate mandates. Their role may complement conservation (e.g. protected areas, fulfilling sustainable livelihood requirements), or conflict with it (e.g. large infrastructure or unsustainable resource extraction projects), but in either case can be seen as crucial for local or national interest by local people and/or policymakers. For the landscape management planning process to be successful, it is crucial not only to work closely in a participative manner with local communities, but also to identify and engage with the other stakeholders in the landscape. Detailed information on how to conduct a Stakeholder Analysis can be found in Addendum 3: Stakeholder Analysis.

4. Types of Participation

There are various ways of looking at participation. Pretty and Smith (2004) provide a useful description of the typology of participation. Simple examples using people-wildlife conflict mitigation are provided for some types of participation:

4.1 Passive Participation

People participate by being told what has been decided or has already happened, and project implementers proceed without seeking their inputs or taking their needs into consideration. This approach may often not lead to desirable action based on the real needs of both management and people.

Example: Livestock is lost to snow leopards in a village with just five households, but these are spread out widely on a mountain slope. Damage primarily occurs in the age-old corrals placed near the houses and fields based on some seasonal criteria of using them. A conservation agency with funds for corral improvement decides to help in constructing one single large corral near the center of the village to help reduce losses and goes ahead with the implementation using hired labor and discussions with just the village head. Unfortunately, people refuse to use this centralized corral, as it is inefficient for feeding, milking, taking animals out for herding every morning and returning them back to the corral in the evening. The corral, thus, remains unused and, in due course, the villagers dismantle usable parts like mesh fence and iron rods for other uses.

4.2 Consultative Participation

People participate by answering questions, with no share in decision-making, but their views may be incorporated. The variety of questions asked by the official team during the consultation can raise expectations, but can be disappointing if subsequent actions are not based on the responses.

Example: A conservation agency arrives in a village and holds a large meeting to help reduce conflicts. After the interaction, however, they implement a central corral based on their donor funding, something that was clearly not the preferred solution in the meeting. In addition, they use outside labor for more efficient and cheaper construction. The expectations were raised due to the size of the meeting and the potential investment, but the conservation benefit in the end was negligible or even negative.

4.3 Bought Participation

People participate in return for food, cash or other material incentives, but without their decisions. This is equivalent to paid labor and wouldn't qualify as participation. This should be distinguished from any case where a community is paid based on its role in decision-making and a work-plan where they were involved along with other stakeholders (see below).

Example: In the above example for 'consultative participation', if the conservation agency pays community members for building the centralized corral, it can be called 'bought participation'. Here, the community still don't have any decision making role or conservation benefits but can earn some money.

4.4 Functional Participation

Participation is seen by external agencies as a means to achieve their goals, and people may form groups to meet predetermined objectives.

Example: An agency arrives in a village with the intention of setting up an insurance program for high value horses. However, on arrival they realize that the recent losses are more in corrals and that since the past two years, the villagers have moved more towards stall-fed cattle than horses. The agency is, however, bound by their funding to set up an insurance program and they somehow manage to set one up with a few villagers. The program isn't sustained since it was not viable with only few participants and a problem that wasn't significant.

4.5 Interactive Participation

People participate in joint analysis, development of action plans and form or strengthen local groups and institutions.

Example: Agency knows that there is an issue with snow leopard depredation in a village. They arrive with an open mind and a few options for managing the conflicts. They use their prior interactions with key informants and multiple discussions on recent patterns of conflicts to work on the solutions with the community. It emerges that since the importance of horses has reduced due to road access, the threat is limited to cattle and a small stock is kept in unprotected corrals with a few horses and yaks lost during two months of spring in a certain pasture. The team and local community identify the two priority corrals to be improved and work on clear responsibilities and timelines for the work to be done. The community also takes on the role of deputing two herders to take care of the yaks and horses during the two vulnerable months of spring based on an equal contribution from all households. The conservation agency, too, contributes 5% of the total cost of hiring the herders for the first three years. This program

sustains over a long period. The community has also developed the capacity for adapting the program and rules with changing herding patterns.

Photo 3. Wire fencing is used to improve a corral and prevent human-wildlife contact in India. Photo Credit: Nature Conservation Foundation / Snow Leopard Trust

4.6 Self-Mobilization

People participate by taking initiative independently and retain control over how resources are used.

Example: Based on the above example (Interactive Participation) – on their own, the community identifies another two corrals up in the pastures with increased depredation. They realize that instead of losing tens of livestock, the entire cost of external goods needed for the corral improvement was equivalent to the cost of 5 sheep. They decide to pool this cash, along with their labor and complete improving the corral on their own, a task that is ultimately useful for their livelihood.

Positive outcomes are associated primarily with the last three types, i.e., Functional, Interactive and Self-Mobilized participation so it is best to use these methods in the development of landscape management plans. It is important to note that the Passive, Consultative or Bought participation doesn't get into the GSLEP management planning process as this can be damaging to the cause of conservation as well as relationships with the community.

Photo 4. Stakeholder meeting in Pakistan. Photo: Snow Leopard Trust/SLF-Pakistan.

5. Tools for Assessments

The methods to understand local dependencies in space and time, understanding their concerns, livelihood threats, etc. can often be learnt through the Participatory Learning and Action (PLA) tools, which can be broadly classed in these four categories (see resources given below under Tools and Techniques for more details regarding the methods):

1. *Interviews and Discussions*: e.g. Semi structured interviews, key-informant discussions, brainstorming sessions
2. *Mapping and Diagrammatic representation*: e.g. Resource mapping, trend lines, Venn diagrams, mobility maps
3. *Direct observations*: e.g. Transect walks, participant observations
4. *Ranking and classification*: e.g. Matrix ranking, pair-wise ranking

These tools are very handy and often lead to information usable for landscape level planning. While the need for more accurate and academic studies on aspects of ecology and human society are useful for planning, often, these are not available, especially over vast areas. Well-designed PLA tools are, thus, helpful for data and information that may not be totally robust, but is usually considered enough for planning purposes. Literature refers to it with terms such as 'optimal ignorance' and 'appropriate imprecision' (Chambers 1981).

6. Steps in Participatory Engagement

As stated above, and in the Addendum XXX (Strategic Planning), we propose addressing community level threats together with the community to understand the threat, work on possible solutions through planning and then implement the action. The four phases of participatory engagement for the facilitators often are 1) pre-planning, 2) strategic planning, 3) action-planning and 4) implementation. Further details on these three phases are provided below:

6.1 Pre-planning

This is for the facilitators to understand the broad context of the area and develop their own team.

1. *Preparation*: Collate and review available literature, statistic and maps. Try to understand threats to wildlife, as well as local livelihoods.
2. *Vision*: Based on the available information, the facilitators develop their tentative vision of change for the community and other stakeholders.
3. *Approach and process determination*: Composition of the team, given the nature of the community, expectations of level of participation, timing of workshops, duration of involvement of the agency (short or long term). Identify one or two well-informed local persons who can complement the team. Will be useful to include a local lady who can bring in women's views more effectively.
4. *Stakeholder Sensitization*: Sensitize the stakeholders about the participatory meeting and the general thrust of the meeting (natural resource management issues in our case) so that discussions can be kept more focused.

Informal discussions and time spent socializing with the community (as well as other stakeholders) is a strong means to develop a more nuanced understanding of their issues and concerns. However, such time is most often not available for the management planning team. It is, thus, valuable to include any facilitators with long-term insights from the area. It is important to invest in the capacity of the facilitators so that they get professional and on the job training for more effective assessments and engagement.

A useful comment by Chambers made early on in 1997 warns of the importance of facilitator attitudes. Quoting from his book: "*As PRA approaches and methods spread, the prime importance of facilitators' behaviour and attitudes became clear. Again and again, outsiders wagged their fingers, criticized, lectured, interrupted, suggested what should be done, put forward their own ideas, and contradicted and put down local people. All these were inhibiting. All made local people appear, to outsiders and themselves, incapable. So the new imperatives became to establish rapport, to sit down, listen and learn, to be patient, to respect, to facilitate, to be nice to people, to learn not to interview, to know when not to speak and when not to be present. The task for outsiders became to hand over the stick, to empower local people, to enhance their confidence, to enable them to define, express and analyse their reality, and not to reflect that of the outsider*."

6.2 Strategic planning

This is for the facilitators to revise their understanding if needed, through structured engagements with the stakeholders.

1. *Stakeholders' Vision*: Understanding and documenting the community's vision of change. A separate 'institutional analysis' will help in understanding the mandates of the other stakeholders (see Addendum 3. Stakeholder Analysis). This engagement will also try to inform them about the management planning process and understand their expectations from the process.
2. *Situation analysis*: Gain an overview of socio-ecological state of the community using various tools, for example:
    a. Mapping of space and time (resource mapping, trend lines), oral histories, calendars
    b. Diagrammatic representation of relationships (Venn diagrams, flow charts)
    c. Representation of preferences (ranking exercises) and relative problems (Pairwise ranking is a useful tool here)
3. *Problem identification*: The situation analysis leads to identification of problems. This can include a list of issues and their linkages. A 'Problem Tree' is useful in looking at the problems, their causes and consequences to conservation (see Sutherland 2000).
4. *Prioritize problems*: Prioritize problems in terms of the need to tackle them, and define the objectives of the plan (Considering the internal heterogeneity of communities, different segments may have different priorities.). The Problem Tree can be used to prepare an 'Objective Tree'. The objectives within the scope of the management planning exercise can be selected for the next steps.
5. *Solutions*:
    a. Community provides its own solutions and may need assistance in implementation. Alternatively, facilitators may suggest solutions based on know-how not present in the community or based on their experiences from other similar situations.
    b. Identify activities from all possible options.
6. *Prioritize activities*: Prioritize the activities identified for solving problem. Differences regarding ranking of activities may arise within the community and will require resolution.
7. *Spatial plan*: Location of each of the activities are put on a resource map or GIS map, if available.

6.3 Action planning

1. *Allocation of activities*: Activities are assigned to different stakeholders. There is clarity on the roles, responsibilities and privileges.
2. *Time line*: Time lines for each activity is determined and agreed
3. *Resources/ Budget*: availability of resources (skilled human resource, labor, raw material. etc.) and funds are determined and allocated. It is ideal that all involved stakeholders co-finance in cash or kind as that builds greater ownership
4. *Evaluate suitability for marginal groups*: The effect of the plan on marginal groups and weaker sections are determined and if necessary, steps are modified
5. *Monitoring and evaluation*: A system of monitoring and evaluation is put in place

6.4 Implementation

Implement and evaluate the activity(s) as per the action plan. This is a key step where the delivery of the process takes place. Proper and transparent implementation and evaluation helps generate goodwill and better trust. If planning is not followed by action at the agreed time, it can lead to mistrust towards the process.

7. Limitations of Participatory Engagement

In 1996, the International Institute for Environment and Development (IIED), London, issued a list of potential problems facing the increased use of participatory tools at huge scales. They welcomed the efforts to mainstream participation in donor agencies such as the World Bank, and the increasing stress on participation by Governments and Government departments but pointed to the fact that the quality of participatory work was impeded by the sheer scale, poor capacity of facilitators, donor driven programs and short time for assessments (From PLA Notes 27 [http://pubs.iied.org/G01664/], from a workshop in Bangalore in 1996). It is stressed here that like any other idea and tool, participation has its merits but needs to be carried out by motivated facilitators with good understanding of the processes, and with enough time and resources. The aim of this document is to provide some helpful guidance.

8. Key Resources

There are numerous credible resources available online (see for example https://en.wikipedia.org/wiki/Participatory_action_research), on the philosophy, approaches and tools for ensuring good participation of stakeholders. Most development funders, too, often propagate a certain type of well-researched and used participatory approach. Users of this document are advised to search for these resources. Here, a very brief selection has been provided, which is by no means comprehensive.

8.1 Participatory approaches and philosophy

- Chambers, R. (1997). Whose Reality Counts? Putting the First Last. Intermediate Technology Publications, Bradford, UK.
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8.2 Tools and techniques

- Anonymous (2009). Participatory Tools Handbook, HKKH Partnership for Ecosystem Management, CESVI, Project Activity Code (s): A.1.5.4, June 2009, EvK2CNR, ICIMOD, CESVI, IUCN.

- The Mountain Institute (2000) Community-Based Tourism for Conservation and Development: A Resource Kit, The Mountain Institute
  [http://mountain.org/sites/default/files/attachments/community_based_tourism_for_conservation_and_development.pdf]
- Participatory Methods, Institute of Developmental Studies, University of Sussex, UK
  [http://www.participatorymethods.org]

Stakeholder Analysis in Snow Leopard Landscape Management Planning

Advice Document Addendum to the General Guidelines for Climate Smart Snow Leopard Landscape Management Planning

Lead Author: Yash Veer Bhatnagar, PhD, (yash@ncf-india.org), Nature Conservation Foundation/Snow Leopard Trust, WWF, 3076/5 IV Cross, Gokulam Park, Mysuru, 570020, India; Chris Czarnecki (chris@snowleopard.org), Snow Leopard Trust 4649 Sunnyside Ave N #325, Seattle, WA 98103.
Contributing Editors: Nilanga Jayasinghe (nilanga.jayasinghe@wwfus.org)

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1. Background

The home range of an individual snow leopard can range in size from 200 km^2 to more than 1,500 km^2; thus, a landscape containing a healthy population of snow leopards can span thousands of square kilometres - much larger than most protected areas located across snow leopard range. Further, studies have shown that over half the snow leopard population in the world may occur outside protected areas, thus making it imperative to design and implement conservation efforts at the landscape level. Securing such a large area for snow leopard conservation is a complex undertaking as it is likely to encompass a variety of traditional and modern land uses such as agriculture, animal husbandry, forestry, resource extraction, rural and urban development and conservation. This large-scale human-wildlife interface means that numerous stakeholders are naturally a part of landscape level management.

Who is a stakeholder? A stakeholder is an individual, group or institution that has an interest in or is impacted by a project. Stakeholders, particularly influential ones such as government departments or industries, can play a decisive role in how a landscape is managed. Most of these agencies are active in the landscape due to long-standing and legitimate mandates. Their role may complement conservation (e.g. protected areas, fulfilling sustainable livelihood requirements), or conflict with it (e.g. large infrastructure or unsustainable resource extraction projects), but in either case can be seen as crucial for local or national interest by local people and/or policymakers.

For the landscape management planning process to be successful, it is crucial to not only work closely with local communities (as discussed in Addendum 2: Participation in Conservation), but also to identify and engage with the other stakeholders in the landscape. In this document, we discuss ways to identify the stakeholders in a snow leopard landscape, analyze their activities and roles in the landscape and strategically engage with them during the landscape management planning and implementation process.

This document is intended to provide additional guidance on stakeholder analysis, as a supplement to the existing guidance framework developed by the GSLEP, titled, "*General Guidelines for Snow Leopard Landscape Management Planning*."

Photo 1. A female snow leopard takes care of her two cubs in Kyrgyzstan's Sarychat-Ertash State Nature Reserve. Photo Credit: SLF Kyrgyzstan / Snow Leopard Trust

2. Identifying Stakeholders

2.1 Identify known stakeholders

The first step in conducting a stakeholder analysis for your landscape is to identify all of the known stakeholders in the landscape. First, consider the types of stakeholders in the landscape. Once you have identified the types of stakeholders in your landscape, you can then systematically list the individual stakeholders that fall within each type. Often the best way to search for these stakeholders is to have discussions with key people in district administration, local NGOs and local communities and through the perusal of websites. These methods can also assist in finding some less known stakeholders. Here are some examples of types of stakeholders frequently found in snow leopard landscapes:

- **Local communities** including both small villages and larger towns or cities located within the landscape, as well as downstream
- **Local traditional institutions** such as pasture user groups, village elders and women's groups
- **Religious institutions**, such as monasteries or mosques that may own land and may be respected by the community
- **Government agencies**, both local and national, who are in charge of human welfare, economic development, national security, conservation, etc. These include the district or county administration, line agencies and the department that will lead the implementation of the management plan
- **Non-governmental agencies** with their own economic development, social welfare and/or conservation goals and objectives
- **Private businesses and industry** including small local businesses and enterprises, as well as national or multi-national corporations
- **National and international donor agencies** who often have keen interest in supporting tenable welfare, development or conservation programs in the region
- **Academic institutions** including Schools and Universities that may help generate crucial information on themes such as biodiversity, socioeconomics that are crucial for a good management plan
- **Politicians** at different levels of governance are important as they respond to public opinion and make policies for both conservation and development

2.2 Discover and identify unknown stakeholders

While you may be aware of most of the stakeholders within your landscape, it is possible there are other stakeholders of whom you may not be aware. For example, a resource extraction company could be quietly holding a license on a parcel of land to use in the future, or a government agency that is not currently operating any projects in the landscape could be planning the construction of a road five years from now. The resource extraction company and the government agency, as well as the populations, communities and institutions that will be affected by the projects, could thus be considered stakeholders in the landscape and should be engaged during the landscape management planning process.

One method of discovering unknown stakeholders in the landscape is to engage in discussions with the known stakeholders. You should talk to local community members, government officials and NGO partners and inquire about other institutions that may be working in the area. It should be noted that the entire stakeholder analysis process is not a linear one, but rather an iterative process that may require multiple inquiries and discussions with key contacts, as well as repeated analysis and engagement as information is gathered.

Finally, you should think beyond the boundaries of your landscape. Are there communities, populations or industries located outside of your landscape that are dependent on it? Where are they located? How and to what extent are they dependent on the landscape?

3. Analyzing Stakeholders[1]

Stakeholder analysis in project management is the process of identifying the individuals or groups that are likely to affect or be affected by the project, and assessing how the interests of those stakeholders should be addressed in a project plan, policy, program or other actions. Thus, stakeholder analysis consists of weighing and balancing all of the competing demands on a project by those who have a role in it, in order to arrive at fulfilling the project's obligation.

Therefore, the goal of stakeholder analysis is to develop better understanding and cooperation between stakeholders and the project team and, ultimately, assure successful outcomes for the management plan (see Appendix 1 for an example).

Once you have identified the stakeholders in your landscape, you can begin your analysis to determine which stakeholders may serve as key partners or threats to snow leopard conservation efforts, and ultimately how you will engage each stakeholder in the landscape management planning process (see Addendum 4: Integrated Management and Governance of GSLEP Landscapes). The broad steps of Stakeholder Analysis, including how the information can be utilized for management plan implementation, are given below:

3.1 Categorize the stakeholders

Broadly categorize agencies under sectors such as production (e.g. agriculture, veterinary, horticulture), welfare (e.g. health, rural development), business (e.g. local small business, tourism, industry), administration (e.g. district administration, village level elected body), infrastructure (e.g. roads, power projects), national security (e.g. army or paramilitary), conservation (e.g. forestry, NGOs), etc. The agencies can also be tagged as government, non-government, traditional, etc. (see section 2.1 Identify known stakeholders above). Each agency can also be tagged at spatial or administrative levels as local, regional, provincial or national.

3.2 Gather key information on stakeholders

To better analyze the stakeholders in your landscape, gather as much information as you can on each stakeholder. Importantly, this information can include their mandates, projects (past, present and future), key personnel, funding sources, existing partnerships, relationships with other agencies and

[1] This document uses the term Stakeholder Analysis, but the same is also referred to as 'Institutional Analysis' in some sources.

legal standing of their work. The recommendation is to create a table or chart to organize this information (see Appendix 2).

Additional queries can include:

- What is their environmental impact on the landscape? You can explore if there is any environmental impact assessment (EIA) of their project.
- What is their level of political and financial influence? This, naturally, is a sensitive matter but crucial for the management plan. It is important for the team to know this, but need not be included in the management plan document as such.
- What is their estimated level of support for landscape management planning? Assess this after you have explained the management plan process to them (see section 4.1 Conduct outreach to stakeholders section below)
- Where specifically in the landscape are they located, working or planning to work?
- Which management strategies and/or direct threats are they related to (e.g. research and documentation, habitat management, policy and legislation, fund raising, poaching and human-snow leopard conflict management, etc.)

Photo 2. Stakeholder meeting. Photo: Snow Leopard Trust.

As previously mentioned, this information can be gathered from conversations with stakeholders or from publicly available information such as websites. Annual reports or development plans produced by district administration or institutions can often be a good source of information as well. In many instances, however, the best way to gather information about a particular stakeholder will be to speak directly to that stakeholder. Ensure that you are able to speak with the concerned official or community leader or key informant. More information about engaging directly with stakeholders is provided below.

Information on projects and programs should be gathered for at least the past five years and for five to ten years in the future as well.

3.3 Prioritize stakeholders and identify areas of convergence and divergence

Once you have gathered information on the stakeholders in your landscape, you will have at least an initial understanding and list of which stakeholders may be potential partners in snow leopard conservation and the landscape management planning process and which may serve as threats. You can take this understanding a step further by analysing the information you have gathered to rank the stakeholders according to their level of importance for snow leopard conservation in the landscape and their potential level of partnership and collaboration in landscape management planning (see Addendum 1: Strategic Management Planning in Snow Leopard Landscapes and Appendix 2 below).

Furthermore, identify specific areas of convergence where collaborative work can be included in the management plan, as well as areas of divergence where dialogue and negotiations may need to take place to minimize negative impacts on the landscape.

Photo 3. Stakeholders collaborate on a snow leopard landscape management plan in Nepal. Photo: Koustubh Sharma.

With regard to convergence, identify where already existing projects or work synergizes with the conservation goals under the management plan. For example, the Agriculture Department may have an existing pasture development scheme with enough resources for work throughout the landscape. The management plan, too, may recognise habitat restoration through pasture development as an activity. Early discussions and identification of these shared goals can lead to collaboration in terms of the pastures to be selected, fodder species or methods to be used, etc. The work can be carried out in a manner that benefits both the Agriculture Department and its constituents and snow leopard

conservation (see more on convergence mechanisms in Addendum 4: Integrated Management and Governance of GSLEP Landscapes).

It is also clear that there will be areas of divergence where mandates of projects or agencies conflict with the landscape management plan and conservation goals. These areas of divergence can be included in the threats to your landscape management plan with details provided about how the conflicting project will harm conservation. Determining how to address areas of divergence can be challenging as they may be led or invested in by powerful interests such as businesses, government departments or entire communities. Early detection and details about such a project can help in preparing steps for resolution. The team should identify the problem clearly, study all related interests, legal issues and political support. It will also be useful to consult with subject experts to learn about any alternatives. These may include negotiations to stop or alter the project. In some cases, suitable compensatory mechanisms or offsets can be negotiated that can help other aspects of the management plan. In some rare cases where the impacts can be demonstrably negative, data can be provided to specialised agencies to take legal recourse.

4. Engaging with Stakeholders

Once you have identified and conducted an initial analysis of the stakeholders in the landscape, meet with the stakeholders that you have not yet met with and continue to meet with stakeholders that you have already had discussions with if necessary. The team visiting the stakeholders is extremely important for the landscape management planning process as they are possibly the first interface for the stakeholders to learn about the process, its goals, objectives, philosophy and their possible role in it. The manner in which the team interacts with the stakeholders is crucial; these aspects are discussed below:

4.1 Conduct outreach to stakeholders

Your initial discussions with stakeholders may be your primary method of learning about them, their involvement in the landscape and their potential status as partners in snow leopard conservation and the landscape management planning process.

For the stakeholder, it may be their first time hearing about the landscape management planning process. This is a good opportunity to inform them about the GSLEP landscape conservation initiative, its goals and leadership and to answer any questions that they may have. Specifically, stakeholders are often concerned about new restrictive protected areas – you can use this opportunity to inform them that this initiative is not about the creation of vast protected areas, but is about developing an inclusive landscape management program where they are likely partners.

While the landscape management planning process is ideally a collaborative process, you should think strategically about the best way to initially engage with each stakeholder. Should you reach out to them directly or through a mutual connection or institution? Do you need permission to meet with them? Will a letter of introduction from a suitable politician or officer be useful? Would it be better to meet with multiple stakeholders at one time in a workshop or official meeting? What questions should you ask? The team can also think of producing a simple flier in the local language with brief information on the

GSLEP process, the national Government's commitment to it, and the plan's inclusive nature for conservation and development. Such printed information can be a positive reference for them.

4.2 Form an assessment team

As mentioned above, the team doing the assessments is key to the process. Here are some basic guidelines for your assessment team:

1. Select an effective team of staff, students and volunteers who are interested in the process.
2. Invest in the team's capacity, helping them to understand the management plan, its philosophy, goals and implementation approach.
3. Invest in informing any team members that may not have been involved in the stakeholder analysis process about the stakeholders so that they have the right questions ready (see section 3.2 Gather key information on stakeholders above). The team members should be in a position to ask questions and provide feedback if any issue or scheme is inadvertently left out in the discussions.
4. If questions arise that the team cannot answer, they should revert back to the stakeholders for answers or responses.
5. The team should be respectful and courteous irrespective of the stakeholder's behaviour or status.

5. Conclusions

Stakeholders can have legitimate stakes in the landscape that may complement or conflict with snow leopard conservation goals. A stakeholder analysis process enables you to optimize the benefits of positive programs by avoiding duplication, involving diverse agencies in conservation, saving conservation funds and generating long-term collaboration. At the same time, this analysis allows us to deal with potential conflicts with stakeholders through a better understanding of the conflicts and space to negotiate a settlement using a proactive, rather than a reactive, approach. The stakeholder analysis can, thus, strengthen conservation in the landscape using a true partnership-based approach (see Appendix 1 for an example).

References

- Sutherland, W. (2000). Conservation Handbook: Research, Management and Policy. Blackwell Publishing. Oxford, UK. (see Chapter 7: Conservation Planning, Chapter 8: Organisational management and fund raising, and Chapter 14: Integrating Conservation and Development)

- Anonymous (2011). Management Plan for the Upper Spiti Landscape Including the Kibber Wildlife Sanctuary. Wildlife Wing, Himachal Pradesh Forest Department & Nature Conservation Foundation, Mysore. (See Chapter 2.4 Institutions in Spiti and Chapter 7: Set up Mechanisms for Collaborative Conservation.)

Appendices

Appendix 1: The need of stakeholder analysis in management planning: an example

A snow leopard landscape spans across 10,000 km^2 that includes 10 villages. Using an analysis of biodiversity values, traditional threats to biodiversity and needs of local communities, a management plan was prepared that dealt extensively with local issues. The plan also identified four critical snow leopard areas that had demonstrably better values for wildlife and arranged for its conservation with local communities. Activities aimed at managing livestock depredation by snow leopards was worked out with the most affected communities through detailed participatory processes. Further, given the very poor situation of energy for both cooking and lighting a program to provide subsidized cooking gas and solar lighting was arranged at considerable cost (30% of the management plan's allocations). Three scenarios are discussed below:

1. Energy: In the second year of the management plan implementation, the team, after considerable effort, was able to arrange for solar lighting in 3 of the 10 villages. However, at the same time the Government's department of energy already had a program for solar lighting through decentralized solar plants in five of the large villages along with an integrated solar kit that also charges mobiles for the remaining five smaller villages. The need for the solar lanterns in the villages supported by the management plan declined in another year and was discarded by the villagers.

2. Conflict management included corral improvements for livestock for which 20% of project costs were kept aside. Village meetings were held and corral improvement work was planned in four priority villages. However, since the problem of depredation and heavy winter snowfall had been acute for the past years, the villagers had been demanding covered corrals from the local administration. The animal husbandry department had already approved corral improvement for all 10 villages and the program began around the same time as the management plan implementation, thus making the effort by the management plan redundant.

3. Grazing-free reserves: Four critical snow leopard areas were identified with the support of local people. However, in year three of the management plan implementation, the infrastructure department began work to connect two important border posts that passed through one of these critical snow leopard sites. Upon inquiring with the department, they said the project had been cleared as a project of national importance after an Environmental Impact Assessment five years ago, and implementation began as soon as funds were available and cannot be altered at this stage.

In all of the above examples, prior information about the programs of other agencies would have greatly helped the management plan's focus areas and efficiency. In the case of solar lighting and corral improvements, precious funds could have been saved while also providing an opportunity for the other departments to participate in conservation. In the case of the road and grazing-free reserves, prior consultation could have helped in potentially negotiating realignment.

Appendix 2: An example of stakeholder analysis from the Upper Spiti Landscape

A) Table excerpted from the Upper Spiti Landscape Management Plan (Anonymous 2011) illustrating institutional data collected.

Table 2.10: Information on Line Departmental mandates collected through a discussion workshop in November 2009 and personal interviews with concerned officials.

Sr.No.	Department	Mandate	Thrust areas	Flagship Schemes
1.	Desert Development Program	All schemes at watershed level development (mainly water and soil conservation related)	• Water Resource Development, Soil conservation, Horticulture and pasture development. • All Spiti at watershed level (works with watershed committees.	• Water Resource Development - Tank canal construction. • Soil conservation – Land development, check dam construction. • Horticulture development – apple and poplar plantation in lower valleys. • Pasture development. – (unclear, but from discussions it emerged that it mainly entails in diverting water to pastures) • Artificial glaciers (Snow harvesting) in Tashigang and Getey.
2.	Block Development Office	• Implementation of various development schemes for alleviation of poverty and empowering people to have sustainable livelihood. • Encouraging and implementing decentralized planning	• Development of infrastructure in rural areas • Generation of employment and poverty alleviation • Providing basic amenities like drinking water and sanitation • Land development and water/snow harvesting	• National Rural Employment guarantee scheme (NREGA) • *Swarnjayanti Gram Swarozgar Yojna* • *Indira Awas Yojna* • Total Sanitation Campaign • Tribal Sub-plan • Drought Area Development Program • Integrated Watershed development program

Sr.No.	Department	Mandate	Thrust areas	Flagship Schemes
3.	*Sarva-Shiksha Abhiyan*	• Universalization of elementary education • 100% enrolment of school going age children • 100% retention, zero dropouts • To provide quality education, improve infrastructure and innovative schemes	All Primary, Middle, Higher and senior secondary schools	• Provide Teacher training. • Community mobilization • Yoga education to all physical education teachers • Exposure tours, health hygiene, First aid Training to all school children.
6.	Animal Husbandry	• Genetic improvement of livestock • Improve Health Status of Livestock • To keep animals disease free	• Genetic improvement of livestock for milk production • Availability of feed and fodder • Prevention of major outbreak of diseases	• Shepherd Insurance program • Provision of feed in 100% freight subsidy. • Provision of fodder seed in 50% subsidy
7.	Agriculture Department	• Increase agriculture production. • Provision of new agricultural technologies and agricultural implements. • Promotion of organic fertilizer material such as Gobar khaad (dung compost) and Kechua Khaad (vermicompost).	• Promotion of improved seeds. • Promotion of new irrigation techniques, such as sprinkler and drip irrigation	• Distribution of improved seeds and new technologies in agricultural implements. • Promotion of organic agriculture. • Laghu Sinchai Yojna (micro irrigation project) - providing sprinklers, tank, drips etc. • Promotion of green fodder and green manure. • Promotion of organic fertilizers (Dung and vermicompost) in the place of chemical fertilizers. • Awareness campaigns among farmers. • Promotion of mixed-agriculture.

Sr.No.	Department	Mandate	Thrust areas	Flagship Schemes
8.	Horticulture	• Expansion of area under horticulture • Subsidized distribution of fertilizers • Distribution of Apple	Spread apple is all potential sites of Spiti	• Horticulture Technology mission • Development of Horticulture • Distribution of subsidized horticulture material, apple, apricot (saplings) and irrigation material such as water storage tanks and hose pipes.
10.	Him Urja	Providing alternate sources of energy, especially for rural areas	• Micro-hydel projects to provide much needed power in remote areas • Popularize use of solar products	• The Lingti power plant (2 X 200 KW) for Lallung and Pin panchayats • Street lighting (c. 100 installed in Kaza, Tabo & Kibber) • Free distribution of solar cookers (500 being distributed free in Pin) and 200 to schools across Spiti • Six Micro-hydel projects planned, 1.5MW each (Takling, Guru Padma Sambhava, Lobzang Tandup in Mane, & Saral)
11.	HP State Electricity Board	Providing power to all parts of Spiti	Hydroelectricity power generation	Ratang nala power project (2MW) caters to 63 villages covering 3,240 users)
12.	State Bank of India (SBI)			• *Kisan* credit card – loans of upto Rs1 lakh at 7% interest (Rs10-15 thousand per bigha) • *Krishak Uthan Yojna* – loans upto Rs 50 thousand at 7% interest. • *Sahyog Niwas Yojna* – loans upto Rs 50 thousand at 8% interest • Life insurance scheme- entire premium amount is returned after 10 years.

Sr.No.	Department	Mandate	Thrust areas	Flagship Schemes
13.	Public Works Department (PWD)	Develop infrastructure in Spiti	• Construct & maintain roads and buildings in Spiti • Implement the *Pradhan Mantri Grameen Sadak Yojna* (PMGSY)	• Since the decade beginning in 1999 *c.* 117 km of new roads have been added (11.7km/year) with about 102 km being metalled (10.2km/year) • In the same period 47 residential and 36 nonresidential buildings have been added at an average rate of c. 9 per year
14.	Khadi Bhandar	Popularize *khadi* products and help sale of local production		• Local production has had limited success, but a Sheep Wool Centre is present in Kaza • Sale of products has been on an average Rs. 3.36lakhs annually since 2005
16.	Employment exchange	Channelize job opportunities		Till late 2009, 1,140 people were registered of which 29 (2.4%) had be placed
	NGOs			

Sr.No.	Department	Mandate	Thrust areas	Flagship Schemes
1.	Ecosphere (www.spitiecosphere.com)	• "Ecosphere is a social enterprise, which is a collaborative effort of the local community of Spiti and professionals from diverse backgrounds, with a wide spectrum of skills and experience, effectively spanning the bridge from the general to the niche. • Our focus is to create sustainable livelihoods that are linked to nature and culture conservation. As a social enterprise it is our mandate to address the triple bottom-line of conservation, development and economies…"	• Responsible tourism • Organic and natural products from the Himalaya that conserves its ecosystem and sustains local livelihoods • Conservation: Enabling a more sustainable future by linking local economies, conservation and development • Handicrafts development: From 'thangka' paintings on silken canvas, 'zama' with local clay to woolen handicrafts with natural dyes.	• Organizing eco tours and helping communities set up homestays • Help people produce and market organic agricultural produce that includes those from seabuckthorn • Developing marketable handicraft produce from Spiti to augment household incomes • Leverage income generation to help in conservation works
3.	World Wide Fund for Nature (WWF – India) (www.wwfindia.org)	Conservation and awareness generation in India	Responsible tourism in Spiti	WWF is collaborating with Ecosphere to understand tourism in Spiti, and its possible future course to make it environment and culture friendly. NCF is also providing some technical support to this programme

Sr.No.	Department	Mandate	Thrust areas	Flagship Schemes
4.	Nature Conservation Foundation, Mysore (www.conservation.in)	Promote knowledge based conservation in India	• Focused quality research on ecology & human society • Develop effective conservation models, especially using local support • Spread awareness about wildlife and environmental conservation • Help improve local capacity, planning and implementation of conservation works	• Developing snow leopard & prey species monitoring protocols • Understanding and managing people-wildlife conflicts • Developing models for maintaining socially fenced areas for conservation • Awareness programmes directed at school children, teachers and youth • Helping in conservation planning and implementation (this management plan)

B) Example of Stakeholder analysis highlighting areas of convergence and divergence with conservation goals. Please note that these are summarized for sectors rather than each agency per se.

Table 7.1: Sectoral convergence for conservation in Spiti based on mandates and thrust areas noted in interviews and by analysis of ITDP 2007-08 Annual Plan document (Table 2.10; Appendix 2.5). 'Convergence' here refers to the possibilities of using departmental mandates for wildlife conservation.

See clubbing together of the various line departments into sectors w.r.t. Spiti in Table 2.11.

Sector	Comments on Convergence or Divergence
Agriculture & allied	• Cash crops such as green peas and recently, apple, have created major avenues of cash income for communities. A possibility of further diversification of cash crops such as apricots is also possible. These are likely to reduce direct dependence of people on local resources • Agriculture & Horticulture Departments have laid emphasis on organic agriculture in their mandates. While this is a positive effort to preserve the traditional organic practices, additional areas under cultivation may put greater demand on rearing more livestock for dung alone; a practice that can potentially be detrimental for local rangelands. This needs to be monitored. • Both the Agriculture & Horticulture Departments have excellent facilities for training and extension of farmers. These structures can be useful to convey environmental messages. • The research and education facilities of the Y.S. Parmar University of Agriculture & Technology, and the Horticulture Department in Tabo, can be very useful in helping with conservation oriented agro-ecology research, monitoring and implementation.

Sector	Comments on Convergence or Divergence
	• The Agriculture & Horticulture Departments are aware of their socioeconomic responsibility, especially of helping the economically poorer sections and women. • The Horticulture Department in fact states a clear environmental objective as "Develop horticulture as an environment friendly enterprise for economic development, environment conservation and development of ecotourism" • Irrigation projects appear to have both, positive and negative impacts on conservation. The economic resources generated from the fields mostly help in making the communities less dependent on other local resources. The seepage from the channels (khuls) often enrich the adjacent pastures. However, the labour force used to construct and often to maintain the channels are from outside, who are known to disturb wildlife or cause undue disturbance. • Historically, harvest of water for agriculture has led to reduction in productivity of pastures, especially those close to glaciers and springs.
Animal Husbandry & allied	• Fodder development programmes are an important aspect of the Animal Husbandry Department and can greatly reduce grazing pressures from rangelands and confining pressures to limited areas near settlements • Value addition of endangered livestock breeds such as the Chumurti horses is an important aspect, and can be leveraged in the tourism business • Prophylactic care and treatment of livestock against diseases and parasites is an important aspect of the department, something that clearly helps conservation of wild herbivores. Such care, especially close to the 'core' reserves identified in this plan can be very helpful for conservation • Fisheries Department has had a slow growth in Spiti as local communities revere fishes and avoid eating or killing them. Some aspects of fisheries, such as angling can have potential in tourism and are recognized by the department • Any move to increase livestock numbers can have damaging impacts on rangelands and wildlife in general and this needs to be avoided. • Some exotic fishes such as the Arctic char are being introduced in rivers and streams of Spiti and can potentially wipe out the native fish fauna
Central	• The BADP, DDP and SADA are all central resources with crosscutting priorities in particular areas. They provide inputs in fields of infrastructure, agriculture, animal husbandry, soil conservation, etc; all fields that have a significant environmental imprint
Disaster	• Primarily flood control department. Mandated to help in emergencies with high potential for prevention of erosion
Cooperatives and Industry	• Industrial development and commercial activities through cooperatives remain primarily potential options for augmenting local incomes and can be leveraged for conservation activities

Sector	Comments on Convergence or Divergence
	• Programmes for providing credit, skills training, marketing, transport and even tourism enterprise is possible • Both departments have programmes for training of youth and others in managing and running cooperatives or small-scale industry, including exposure visits to organizations of national repute. Locally prevalent skills in Thangka paintings, rock carving, woolen products and yak based products can be channelized under this initiative • Scoping studies can be conducted to determine the various environment friendly options of industry in the landscape • The State Bank of India, Kaza provides loans for entrepreneurs, students and even setting up self help groups
Education	• The Sarva Siksha Abhiyan has high potential in providing scholarships, infrastructure, but especially in facilitating nature camps on a regular basis. Production of education and awareness material is possible through the SSA that can have a large impact through out the landscape • Education is the cornerstone for opening up the opportunity of employment, both in organizations and for self-employment, which in turn can help reduce local dependence • Technical education can open up opportunities for youth to develop skills, especially in vocational fields • The Public Library can be an important place to have interesting books and publications on wildlife and nature in general, which can help develop interest among the young and old alike. There is a need to revitalize the library in Kaza • The Information & Publicity Department of the Government can help with information dissemination on wildlife values, do's and don'ts for outsiders as well as for local communities • The Youth Services & Sports already recognizes the importance of environmental conservation and had kept it as its theme in 2006-07 priorities under ITDP • The National Service Scheme (NSS) of the Youth can also be channeled for environmental works
Employment	• The Employment Assurance Scheme, the Jawahar Rozgar Yojna and the ongoing Mahatma Gandhi Rural Employment Guarantee Scheme (MGREGA) are major vehicles of bringing in employment opportunities in all fields in the landscape. • Many of the civil works under the plan can potentially tap MGREGA resources
Energy	• Power is the backbone of development. There is however a major deficit of electricity in the landscape, with even the Sub-Divisional HQ having a constant shortage year round. Mini & Micro (and even Pico) Hydel projects in general planned by the HP SEB and Himurja should help overcoming this shortage

Sector	Comments on Convergence or Divergence
	• Conservation agencies often try to invest considerably in the energy sector (solar power, wind power and LPG) with the assumption that these will reduce dependence on local fuel resources. Himurja has a comprehensive mandate to provide solar devices free of cost or at substantial subsidy in the entire landscape. Works on community managed micro-hydel, solar lighting, and maybe even solar cookers and geysers can be complemented by the Management Plan process with some monetary contribution and with prioritization of communities participating in active conservation initiatives • Large power projects aren't yet lined up in Spiti, but they often can cause serious environmental damage and need to be avoided.
Environmental	• The Wildlife Department is the main implementer of this Management Plan. Other departments such as agriculture, soil & water conservation, DDP, BADP also have a role in carrying out environmental works in the landscape • The Forest Department provides fuelwood from outside the landscape (up to 70% of the need), which takes off pressure from at least the local shrubbery. They are also making efforts in habitat restoration, protection of wildlife and community-based catchment area protection to improve habitats and wildlife values • The Wildlife Department is involved with development of pastures immediately around the village lands. This subject needs sounder research to develop ways of doing it most efficiently and using native species. • The Science & Technology (S&T) sector has a mandate to contribute towards solar passive heating of houses to conserve fuel use in winters and promote green houses to enable produce of fruits and vegetables. • The S & T have proposals for rainwater harvesting, but in the Spiti landscape it may be wiser to develop means of tapping the snow/ice using innovative means such as artificial glaciers for both irrigation of crops and water for pasture development. This has been done in Ladakh. • Products from seabuckthorn are an important aspect of their mandate and considerable research on the subject has already been done in the DRDO's High Altitude Lab in Leh, Ladakh (Field Research Laboratory). This can be channalized for use in Spiti, along with efforts of agencies like Ecosphere • A word of caution regarding seabuckthorn harvest – local people have noticed that their harvesting the berries in autumn deprives numerous bird species of this fruit and have on their own reduced and regulated its harvest. The impacts of harvesting the berries (which in most cases is outside village land) needs to be understood • S&T have a mandate to organize Children Science Congress and Science Clubs. These can be utilized effectively in conservation awareness programmes too. They also have a provision to take school children on study tours, which can be tapped for tours to other conservation areas that can help children appreciate their resources better

Sector	Comments on Convergence or Divergence
	• They have programmes for capacity enhancement of local staff, awareness and community members in a variety of subjects and these resources can be channelized better for conservation initiatives based on this plan
Governance	• The Panchayats will make an important interface in the negotiations between the planners and local communities for designating reserves and other related activities
Health	• Since Spiti is an important site for medicinal plant production and traditional use (through the amchi system the Bhot Chikitsa Paddhati), this style of treatment and healing can be encouraged and channeled into tourism industry too • Herbal gardens as maintained by the Forest Department and agencies such as Pragya can become important tourist attractions where knowledge dissemination is arranged (also for local people) • Tremendous caution however needs to be observed for regulating the commercial use of the medicinal plants • The Hospitals are already aware of the safe disposal of medical waste items and this needs to be maintained
Infrastructure	• A top priority sector of the Government in Spiti, this is critical, but can have serious environmental consequences too • The departments involved are PWD, Irrigation & Public health • As of now no clear mechanisms for minimizing environmental impacts of roads and buildings are envisioned. These need to be brought into the agendas of the departments dealing with infrastructure. • All these departments do most works through contractors who bring in outside labourers. The serious threats some of these people can pose to the local environment needs to be understood and mitigated as discussed elsewhere in this Plan (Table 6.1). It is important to have a mechanism for monitoring and addressing these issues
Tourism	• Tourism infrastructure and systems are being promoted that should ultimately help communities. However, a clear linkage with how this will help the community isn't yet stated clearly. • The schemes for preparing publicity and informative material in the form of both print and audio-video formats can be of great help in promoting responsible nature/wildlife tourism • There is a scope of encouraging community based schemes such as homestays and eating places in the region that provide a good cultural experience to visitors • Adventure sports can be encouraged that includes river rafting, mountaineering, etc

Sector	Comments on Convergence or Divergence
	• Capacity enhancement of local youth is possible with the help of tourism and mountaineering departments/agencies
Transport	• Transport facilities into Spiti are rudimentary at present and are often considered one primary cause of limited tourism in the region. Targeted improvement in local transport can help in this cause apart from the much needed help to the local communities
Welfare	• The Rural Development, Civil Supply, The HP SC/ST Development Corporation (HPSCSTDC), Youth Services, etc are important parts of the Government machinery dealing with welfare of the population, an aspect critical to local livelihoods as well as conservation. • Employment generation is an important focal area as also poverty alleviation. Channelizing these programmes in conservation areas through the Planning process can help build the constituency of conservation • The Rural Development Department has already stated goals dealing with promoting environment friendly practices in all its areas of support that include soil conservation, moisture conservation, pasture development, horticulture and agricultural works • Skill based capacity enhancement in a variety of vocational fields in provided for • Promoting Self Help Groups (SHGs) and self employment (through Swarnajayanti Gram Swarozgar Yojnai, Sampoorna Grameen Rozgar Yojna (SGRY), and employment through NREGA, etc • The HPSCSTDC has schemes for promoting tourism enterprises (guest houses, taxi, dhaba, etc.), handicrafts, agriculture and industry related initiatives by community members through SHGs • There is support for skills development available with the HPSCSTDC • Support for awareness generation through publicity material is available with the HPSCSTDC

Integrated Management and Governance of GSLEP Landscapes

Advice Document Addendum to the General Guidelines for Climate Smart Snow Leopard Landscape Management Planning

Lead Author: Yash Veer Bhatnagar, PhD, (yash@ncf-india.org), Nature Conservation Foundation/Snow Leopard Trust, WWF, 3076/5 IV Cross, Gokulam Park, Mysuru, 570020, India
Contributing Editors: Nilanga Jayasinghe (nilanga.jayasinghe@wwfus.org), Chris Czarnecki (chris@snowleopard.org)

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1. Background

In this Advice Document, we hope to highlight the importance of integrating conservation and development activities in GSLEP landscapes with the spirit of cooperation and coordination among stakeholders.

All 23 GSLEP landscapes are geographically large, with over half of them covering more than 10,000 km^2, and the largest covering more than 90,000 km^2. The landscapes are often spread across international or administrative boundaries. They include existing wildlife protected areas (PA), but often, much of the landscape may be under the control or ownership of other government departments, communities or private parties. Conservation, thus, may not be the existing priority for land use in much of a GSLEP landscape.

Even with completely legal rights or mandates, community and agency activities may, at times, be detrimental to wildlife, but there can be opportunities for cooperation, too (see Addendum 3. Stakeholder Analysis). The landscapes may have numerous human settlements with development, human welfare and/or conservation activities that offer potential opportunities for cooperation among agencies. The guiding principle of the GSLEP process is integrated conservation and development, rather than conservation versus development.

Photo 1. The village of Kibber in India's Spiti Valley is located in prime snow leopard habitat at 4,200 meters. Photo Credit: Nature Conservation Foundation / Snow Leopard Trust

Landscape management plan actions will include threat mitigation – tackling various issues involving local communities, such as excessive resource extraction, livestock grazing leading to habitat degradation, poaching and negative interactions between people and wildlife. It will also deal with larger infrastructure and developmental pressures, such as hydropower projects, roads and mines, as

well as other unsustainable developmental schemes, such as intensified agriculture and livestock production. Tackling these issues often requires working simultaneously at multiple levels, from local to landscape to provincial to national and international levels. There is a clear need to mainstream biodiversity concerns in strategy and action at multiple levels.

Due to the sheer size and scale of the GSLEP landscapes and their characteristics, the factors summarized below necessitate **partnerships and forging effective coordination** among stakeholders:

- **Landscape spread across administrative boundaries**. Land use priorities and governance mechanisms may differ across provinces and other administrative boundaries, and control may rest with different officials. Mechanisms to work across these boundaries may not exist.
- **Large number of stakeholders and land tenure patterns**. Land ownership may rest with different government departments, communities and other stakeholders. Further, conservation agencies may have no direct control over much of the area.
- **Multiple officially mandated activities ongoing in the landscape**. Some of the activities may be positive and some negative for conservation goals.
- **Multiple on-going participatory community-level conservation and livelihood initiatives in the landscape**. These positive initiatives may exist, but may be led by different stakeholders with differing approaches, and be spread out unevenly across the landscape. They may lack coordination, and communities may receive opposing signals from different government departments.
- **Funds from a variety of sources may be available and used in the landscape**. These disparate funding sources may lead to over-investment and duplication of efforts in some areas, and under-investment in others.

The landscape management plan, therefore, needs to have suitable mechanisms built in to harmonize and effectively channel both on-going and new efforts. Collaboration and cooperation among stakeholders, referred to as 'convergence' in the document, is key to achieving progress and success in mitigation of threats. This document discusses this issue and provides a few suggested mechanisms for convergence at the landscape scale. It should be noted here that this document assumes that appropriate mechanisms for community participation (e.g. pasture committees, village development committees) are already in place in the landscape under the management plan (see Addendum 1. Strategic Management Planning and Addendum 2. Participation in Conservation) and focuses more on mechanisms at a higher level that can impact the entire landscape, including community-based conservation and development.

2. Ongoing Work on Conservation, Development and Livelihoods

Various stakeholders, from local communities to large corporations, may be involved in the landscape. As a first step, identify and compile a list of these stakeholders and their on-going activities and dependencies on the landscape (see Addendum 3. Stakeholder Analysis). Broadly, the GSLEP management plan will try to mitigate the impacts of imminent threats and proactively address potential threats. Most threats emerge from the stakeholders and some from larger events, such as climate change.

Conservation outcomes can be more effective and long lasting if stakeholder needs, especially those of local communities, are fulfilled and their livelihoods improved. Human welfare in the form of food, energy and water security, as well as education and livelihoods, is crucial for conservation and provides opportunities for engagement with specialized agencies working on these aspects.

As discussed above, the landscape management plan should duly take into consideration all relevant on-going work. The plan may need to initiate appropriate activities in clusters where no activities are happening. In others where activities are currently on-going, the plan should try to align with them. On-going activities in the landscape are likely to include:

1. Government agencies or NGOs implementing programs to secure livelihoods without clear participation of beneficiaries or stakeholders in decision making
2. Government agencies and private sector involved with larger infrastructure and developmental projects using their own resources without clear participation of beneficiaries or stakeholders in decision making
3. Government agencies or NGOs implementing participatory conservation and livelihood projects with the participation of local committees in a village or village clusters

Funding for these activities may be provided by the Government or national and international donors.

3. Challenges of Coordination and Co-management, or 'Convergence'

Often, working through long lasting partnerships becomes difficult. Here, a few of the challenges are discussed.

Issue	Details
Sectorial priorities	Differing institutional mandates may result in conflicts between agencies working in the same area. In particular, this holds true for conservation agencies and their need to regulate consumptive or destructive activities of other agencies. The same parcel of land may be earmarked by agencies for different, and maybe opposing, purposes. *For example, one department may be aiming to triple livestock production to aid in livelihoods, while another may be trying to limit livestock numbers to assist in wildlife conservation.*
Competition	Competing for the same work or same pool of resources. This may be most commonly seen among NGOs that typically have to raise resources through competitive grants and also make their work more visible for future grants and credit. A certain amount of 'territoriality' may be evident.
Duplication	Agencies can have similar mandates and may, thus, duplicate efforts using different approaches and, at times, without core competence. This usually results in wastage of resources, confusion among beneficiaries and conflicts on the ground among departmental functionaries. *For example, 'pasture development' may be undertaken by the Animal Husbandry Department to secure fodder for livestock; Soil Conservation Department to conserve soil; Forestry Department as an eco-development initiative to engage with communities; and the Agricultural Department as a means to promote a certain high*

Issue	Details
	yielding variety of fodder. All agencies may work in the same parcel of land and may duplicate efforts. The Agricultural Department, however, may have the advantage in carrying out field trials for the best production, which other departments may not.
Administrative issues	Officials often have clear jurisdiction and cannot work beyond that. Official hierarchy may play an important role in acceptance or working together. Rules being enforced by a junior official, say the officer who is in-charge of the landscape management plan, may not be accepted by a senior, say in the district administration. Unwillingness to cooperate, to sit together for planning and execution of developmental work can become a significant impediment.
Funding	Government funding most often takes the form of departmental grants based on official schemes, and NGO funding is mostly from competitive grants. Each agency usually has a clear system of accounting and audits to ensure proper utilisation of their resources. The important thing is that funding is mostly sectorial and there may be very few options for sharing of funds among agencies for a common task.

4. Recommendations for Convergence

4.1 Broad principles of engagement

It is important for the management planning to transcend the above challenges in a manner that involves all relevant stakeholders to the best degree possible. The agency entrusted with the development and implementation of the management plan needs to take the onus to bring together the disparate stakeholders to a common meeting ground for conservation, while being sensitive to their individual agendas and legitimate mandates. Some principles that can help in this process are:

1. **Objectively understand the stakeholders** (see Addendum 3. Stakeholder Analysis): Each organisation is not necessarily a threat and there are often more opportunities for cooperation than is conventionally perceived. These convergences of work need to be understood and cooperation needs to be developed carefully. An appreciative enquiry of the stakeholder is helpful in understanding avenues of cooperation. Some agencies will surely have activities detrimental to conservation goals and these issues need to be understood equally well. These areas of divergence also need to be ironed out through understanding, dialogue and a search for alternatives. A sense of mutual respect and acceptance of each other's mandates is helpful in this process.
2. **Obtain political buy-in**: While ground level work is crucial for the management plan's success, an acceptance of the goals and innovative options for implementation need to be accepted at both local and national political levels. The relevant bureaucracies, in particular, need to accept and endorse or approve the plans.
3. **Execute formal arrangements**: As much as possible, initiate work with motivated individuals, but try to institutionalise through formal arrangements (see Section 4.2 below).

Photo 2. Community meeting in Spiti, India. Photo Credit: Snow Leopard Trust/ NCF, India.

4.2 Broad structures for implementation

We have discussed diverse activities from conservation threat mitigation to securing livelihoods that may need to be conducted under the management plan. Each stakeholder usually has an established form of administration or governance that will oversee their roles and efforts and needs to be respected. One of the best options to ensure integrated planning and implementation of the management plans is to establish a new committee or agency with the capacity to oversee participatory landscape-level work. It is important to consider a formal setup that allows for coordination, representation and cost-sharing among participating agencies, as well as transparent and fair fund flow mechanisms.

These formal setups can take the form of 'Coordination Committees' at varying administrative levels, or even a new 'Foundation', 'Society' or NGO registered under the appropriate laws. Coordination committees can help oversee planning, direction-setting and monitoring by partners. Taking it a step further, a Foundation can have dedicated staff and infrastructure to fundraise from a variety of sources and coordinate management plan activities (see examples in Section 5.3 and 5.4 below).

The primary implementing (conservation) agency will need to take a leadership role in both the establishment and the operation of this new committee, Foundation or agency. In rare cases where these types of structures already exist, they can be adapted to help with the GSLEP landscapes.

Here are some other important aspects to take into account when considering a new oversight body for management plan implementation:

Policy: The new and innovative landscape level, participatory and cooperative management plans and their implementing bodies will likely need to integrate with existing policies or require modifications to existing policies (see example of NTNC, Section 5.1 below). This policy knowledge, integration and potential modification may be needed at different levels of governance. It is important here to consider

approval of the management plan at an appropriate government level so that integrated management is possible.

Funding: Funding from different government departments for the management plan's implementation must be well-coordinated ahead of time. Additional funds from donors, offsets or revenue generated in the landscape will need to be raised and effectively channelled back for conservation and development in the landscape. It can be particularly helpful to set up a conservation Trust Fund (CFA 2008) or corpus that is managed by a committee of various stakeholders to facilitate the management plan's implementation. Such a structure can help ensure that funds are fairly managed and distributed and made available during prime working seasons, which can be short in snow leopard range.

Capacity building: Innovative programs at this scale require adequate dedicated and motivated staff and volunteers to implement. Investment in their capacity is crucial. Participating organizations and agencies, thus, need to invest in building the capacity of staff through periodic thematic workshops, exposure visits and provision of equipment. It will be ideal to identify national or regional institutions (such as University of Central Asia, International Centre for Integrated Mountain Development, Wildlife Institute, China, Wildlife Institute of India, etc.) that can formally and systematically lead in building capacity.

Monitoring and evaluation (M&E): Structures for M&E need to be set up to ensure that management plan implementation and governance remains efficient and functional. Expertise may be needed from both national institutions of high credibility and local partners. Individual conservation activities may already have or need their own M&E mechanisms set up at the appropriate level such as the village level or village cluster level.

Finally, integrated management structures for management plan implementation need to be formalized through written agreements or memoranda of understanding (MoU) approved by the Government at the appropriate level. Official approvals for cooperation among agencies at appropriate levels (national, provincial or local) is crucial for functionaries to effectively partner. The MoU can be a broad framework document and can have more specific terms of reference (ToR) for specific tasks. Broadly, the MoU should state mandates and responsibilities, mutual advantages of cooperation, convergence-based activities, beneficiaries, cost sharing and monitoring (Anon. 2014; Annexure 2). The ToR can have further details of specific tasks, work plans, budgets, etc. In many cases, the ToR can be integrated into the MoU itself.

In summary, here is an overview of potential structures for management plan implementation:

Level	Description
National agency for GSLEP implementation	Helps with policy and streamlining cooperation at the level of ministry or department headquarters. Can play a role in larger fundraising efforts. The GSLEP National Focal Point should be a functionary here. In the absence of a formal structure at this level, the NFP may have to fulfill the role independently. National level political buy-in can be an important outcome of this structure.
Provincial body	Can be in the form of a 'Foundation' or a 'Coordination Committee'. Further points will be similar to the details given

Level	Description
	below for landscape level. These setups are useful at the provincial level for obtaining political buy-in.
Landscape level foundation	A Foundation, Society or NGO registered and set up under appropriate law (with a formal set of constituents (relevant stakeholders) and constitution (see example for the Periyar Foundation at www.periyarfoundation.org) and with the purpose of supporting management plan implementation. Led by the implementing agency, this organisation can raise funds from both government and non-government sources, including international agencies, and can source funds to partners based on agreed annual plans, and is audited as per each country's laws. Can have staff for administration, accounting and day to day oversight of work. Governance is aided by MoUs among stakeholders (see below)
Landscape level Coordination Committee	A Coordination Committee typically has members of stakeholders, including government departments, NGOs and community members and is useful for planning, direction setting and monitoring implementation by partners. Governance is aided by MoUs among stakeholders (see below)
Inter-departmental MoUs	These are bilateral, or in some cases multi-lateral, agreements that clarify reasons for coming together, individual mandates, strengths, roles and responsibilities, work plans, funding, credit sharing, reporting, etc. (Anon. 2014; Annexure 2). The MoUs can be overarching departmental frameworks that can have more specific terms of reference
Village level committees	Committees established or recognised by the management plan for the purpose of village level planning and implementation of activities. It is good if there are committed individuals, but ideally the body should be democratically formed. These committees may facilitate local level planning and assist with implementation. They may receive funds and ensure their effective use and timely reporting.
Agency responsible for capacity enhancement	All the above work requires capacity levels often lacking at present. It will be ideal to collaborate with a national or regional organisation of repute that can help with periodic capacity enhancement of personnel involved at different levels.
Agency responsible for monitoring & evaluation	M&E ideally needs to be conducted by an independent entity. These may be recognised and mandated by the government with the task of annual and 5-yearly M&E of the works of the above bodies.

5. Some Examples of Governance Structures in Conservation[1]

In this section, four of the numerous innovative examples of governance structures from snow leopard range countries have been highlighted representing different administrative levels – national, provincial, landscape and PA. The mechanisms used by these structures with regard to participation, convergence, and fund management can be useful for adapting to the GSLEP landscape management plans.

5.1 National level: National Trust for Nature Conservation, Nepal

The National Trust for Nature Conservation (NTNC) was established in 1982 by a Legislative Act as an autonomous and not-for-profit organization, mandated to work in the field of nature conservation in Nepal. This organisation has undertaken over 200 innovative projects in Nepal and has firmly put participatory and landscape level work as an official strategy for conservation. Their Mission Statement is self-explanatory: "To promote, conserve and manage nature in all its diversity balancing human needs with the environment on a sustainable basis for posterity - ensuring maximum community participation with due cognizance of the linkages between economics, environment and ethics through a process in which people are both the principal actors and beneficiaries." The NTNC Act provides the organization a clear mandate and authority to complement and supplement the Government's efforts in nature conservation and sustainable development. NTNC has the direct responsibility of planning and implementing integrated conservation and development programs by running them as projects through comprehensive management plans. The NTNC has a Governing Board of Trustees that consists of distinguished and recognized national and international personalities (Patron is the country's Prime Minister and the Chairperson is the Minister of Forests and Soil Conservation, with membership consisting of top government bureaucrats, national and international academicians and respected local people. NTNC was partly funded by the Government of Nepal but is now able to raise most of its funds through competitive grants and revenues generated by tourism and other enterprises.

Due to its national level governance structure, NTNC can operate projects with flexibility and speed unhindered by bureaucratic red tape, but is recognized as an apolitical and competent organization with high credibility, substantial and rich experiences, and its pioneering achievements in nature conservation are regarded as impressive by different groups of stakeholders, conservation agencies and donors. The Trust's focus in lowland protected areas is primarily on wildlife research and monitoring, which also includes habitat management, biodiversity conservation, community mobilization, anti-poaching and illegal trade control. In the snow leopard range, NTNC is engaged in protected area management by adopting the approach of an integrated conservation and development program where they are handling innovative landscape and participatory projects in the Annapurna Conservation Area Project (ACAP), Manasalu Conservation Area Project (MCAP) and Gaurishankar Conservation Area Project (GCAP). NTNC also works in other areas, such as alternative energy development, sustainable tourism, sustainable agriculture, climate change and gender equity, which further enhances conservation and development work at the landscape level.

Website: http://www.ntnc.org.np/

5.2 Provincial level: Sikkim Rural Development Programme

[1] Excerpted from respective Websites

With the objective of sustainable development in the mountains of Sikkim, India, the Rural Development Department of the State has developed a mechanism for enabling convergence among agencies through formal bilateral partnerships. These partnerships are based on a larger 'framework' agreement signed at the state headquarter level between the Rural Development Department and the other collaborating departments (e.g. Department of Horticulture), which includes jointly developing annual operations plans, workplans and funding plans, M&E and social audits (Anon 2014, Annexure 2). In this case, a separate governance structure has not been created, but the concerned department (Rural Development in this case) has an internal plan and vision based on which they have developed thematic MoUs to formulate and implement programs.

Website: http://www.mgnregasikkim.org/convergence

5.3 Landscape level: Annapurna Conservation Area Project, Nepal

The ACAP, launched in 1986, is among the earliest examples of participatory conservation in snow leopard range. Its goal, "To achieve sustained balance between nature conservation and socio-economic improvement in the Annapurna Conservation Area (ACA) thereby assisting National Trust for Nature Conservation in achieving its goal" has the following objectives:

- Conserve the natural resources of ACA for the benefit of present and future generations.
- Bring sustainable social and economic development to the local people.
- Develop tourism in such a way that it will have minimum negative impact on the natural, socio-cultural and economic environments.

The ACA covers an area of 7,629 km^2. and is home to over 100,000 residents of different cultural and linguistic groups. The multifaceted challenges in ACA have been addressed through an integrated, community-based conservation and development approach, which is an experimental model that has been the vanguard of promoting the concepts of "Conservation Area" through an "Integrated Conservation and Development Programme." ACAP was first tested as a pilot program in the Ghandruk Village Development Committee (VDC) in 1986. After being notified in the National Gazette as a "Conservation Area" in 1992, ACAP's program now covers the entire area. It is a good practice for countries not to scale up work in the entire landscape at the onset, but test out the innovative ideas in a smaller part of the GSLEP landscape before scaling up.

The primary model is to invest in democratic Village Development Committees (VDCs) in a village or village clusters, and to help with need-based activities there relating to both conservation and livelihoods in its seven geographic units. Much of the funds are generated through community-based tourism activities. The larger set of activities include support for better agriculture and animal husbandry, energy security, tourism and small scale industry. The committees have direct oversight from the NTNC with assistance for a large variety of expertise and cross learning opportunities. All funds for the ACAP are raised from entry fees and other grants, but the Government normally doesn't provide any funds. NTNC is investing heavily in local capacity and motivation of the communities so that they can take over the management into perpetuity.

Website: http://www.ntnc.org.np/project/annapurna-conservation-area-project

5.4 Large PA level: Periyar Foundation, Kerala, India

The Periyar Foundation is a landscape level body that was set up by the provincial government to strengthen participatory conservation of the Periyar Tiger Reserve. “Periyar Foundation is a Government owned public trust with the legality of the Government organization and flexibility of a good non-governmental organization”, is the introduction to the organization on their Facebook page.

The main aim of the Foundation is to facilitate and support Periyar Tiger Reserve management in biodiversity conservation initiatives through eco-development and people’s participation and to support similar initiatives in adjoining landscapes. Its objectives are:

1. Support Periyar Tiger Reserve and the adjoining landscape in biodiversity conservation.
2. Carry forward on-going activities of eco-development committees and their confederations through the Periyar Tiger Reserve management.
3. Foster partnerships in conservation through innovative alternative livelihood options for forest fringe dwellers.
4. Carry forward the spirit of research and impact monitoring in the PA and adjoining landscape with the support of scientists and professionals.
5. Strengthen the stake for conservation through community empowerment, trainings for capacity building, conduct of nature camps and formation of nature clubs for various stakeholders in conservation

The organization, thus, assists in the management of the reserve and adjoining areas using a sound integrated governance mechanism that is facilitated by its ability to innovate, collaborate and raise and use funds in a flexible but legal manner. Based on the successes of this foundation the Ministry of Environment, Forests and Climate Change of the Government of India has set up a knowledge centre for biodiversity conservation and rural livelihoods improvement in the this reserve that is mandated to improve capacity of conservation agencies.

Website: www.periyarfoundation.org (also see this website for example of the Trust Deed to set up a Foundation). Facebook: http://goo.gl/zoqBqf.

6. Key Resources

- Anon. (2014) Convergence of Mahatma Gandhi National Rural Employment Guarantee Scheme with Schemes of Horticulture & Cash Crop Development Department. Department of Rural Development, Govt. of Sikkim, Gangtok.

  Online version available at: www.mgnregasikkim.org/convergence

- Anon. (2015) Social Audit Handbook: An Instrument for making the Programme Accountable to People. Department of Rural Development, Govt. of Sikkim, Gangtok.

  Online version available at: www.mgnregasikkim.org/home/social-audit

- Conservation Finance Alliance (CFA). (2008) Rapid Review of Conservation Trust Funds. Prepared for the CFA Working Group on Environmental Funds by Barry Spergel and Philippe Taïeb.

  Online version: https://www.cbd.int/financial/trustfunds/g-rapidassess.pdf

Best Practices in Snow Leopard Conservation

Advice Document Addendum to the General Guidelines for Climate Smart Snow Leopard Landscape Management Planning

Lead Author: Chris Czarnecki (chris@snowleopard.org), Snow Leopard Trust 4649 Sunnyside Ave N #325, Seattle, WA 98103;
Yash Veer Bhatnagar, PhD, (yash@ncf-india.org), Nature Conservation Foundation/Snow Leopard Trust, WWF, 3076/5 IV Cross, Gokulam Park, Mysuru, 570020, India.
Contributing Editors: Nilanga Jayasinghe (nilanga.jayasinghe@wwfus.org)

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1. Background

The goal of GSLEP (Global Snow Leopard & Ecosystem Protection Program) is for the 12 snow leopard range countries, with support from partner organizations, to work together to identify and secure 20 snow leopard landscapes across the big cat's range by 2020, or, in shorthand – "Secure 20 by 2020".

"Secure" snow leopard landscapes are defined as those that:

1. Contain at least 100 breeding age snow leopards conserved with the involvement of local communities
2. Support adequate and secure prey populations
3. Have functional connectivity to other snow leopard landscapes, some of which cross international boundaries.

"Secure 20 by 2020" serves as the foundation of the ultimate goal of ensuring that snow leopards remain the living icon of Asia's mountains for generations to come.

2. Conservation Activities

"Secure 20 by 2020" will be achieved through concrete project activities that can be grouped under broad themes corresponding to the commitments of the Bishkek Declaration [http://www.worldbank.org/content/dam/Worldbank/document/eca/Bishkek-Declaration-on-the-Conservation-of-Snow-Leopards.pdf]. These activities include:

1. Engaging local communities in conservation, including promoting sustainable livelihoods, and addressing human-wildlife conflict;
2. Managing habitat and prey based upon monitoring and evaluation of populations and range areas;
3. Combatting poaching and illegal trade;
4. Transboundary management and enforcement;
5. Engaging industry;
6. Building capacity and enhancing conservation policies and institutions;
7. Research and monitoring; and
8. Building awareness

The first five activities are direct impact activities, those whose successful completion will increase or maintain snow leopard and prey numbers (or other appropriate measures such as density or occupancy) and/or protect or restore habitat and connectivity among populations.

The last three activities are enabling activities, those that create the conditions for successfully performing or improving the performance of the direct impact activities. For example, building capacity enables improved efforts to combat poaching, while building awareness enables stronger public, political, and financial support for all direct impact activities.

3. Best Practices

Practices that have proven successful in one or more range countries are being scaled up in those countries and emulated in others. For example, programs to increase community participation in conservation, improve livelihoods, and address human-wildlife conflict have been tested in several countries with very promising results including reductions in poaching of snow leopards and increased willingness to co-exist with the predators. Creation of anti-poaching teams and stiff penalties for poaching have also proven effective. Effective scientific monitoring programs are being conducted in several countries and their methods can be readily applied, with adaptation as necessary, in others. Regarding other conservation activities, such as engaging industry, capacity building, policy enhancement and awareness building, successful models are available from other parts of the developing and developed world.

Photo 1. A young snow leopard shows off its camouflage coat in an arid landscape in India's Spiti Valley. Photo Credit: Nature Conservation Foundation / Snow Leopard Trust

We have compiled a list of activities from across the snow leopard's range that serve as good practices that can be adapted and incorporated into your landscape management plans. These best practices are organized by the conservation activities listed above.

3.1 Engaging local communities and addressing human-wildlife conflict

Enhance the role of local communities in snow leopard conservation efforts by adopting and implementing policies and laws that favor **community involvement in conservation**, promoting environmentally sustainable economic activities that directly **benefit local livelihoods**, and supporting community-based programs to **mitigate human-wildlife conflict**.

Reducing and offsetting economic losses due to human-wildlife conflict and making wildlife conservation beneficial for local communities is a core principle of snow leopard conservation. Among the specific

activities by which many countries plan to address this principle are livestock insurance schemes to provide **compensation for losses**, improved **predator-proof livestock corrals** and **improved herding practices**. These practices and others such as **livestock vaccinations** can be emulated and scaled up.

Engaging local communities and addressing human-wildlife conflict		
Country	**Good Practices**	**Brief Results**
Afghanistan	Formation of the community-based Wakhan Pamir Association (WPA) to oversee sustainable natural resource management and economic development. Activities include a patrolling program (65 community rangers plus 10 government rangers) and a comprehensive Environmental Education Program that reaches all 15 schools in Wakhan and has a focus on snow leopard conservation initiatives.	Patrolling program led to few instances of unreported wildlife crime
China	Most of community conservation projects are undertaken by nature reserves, including public education events, establishment of hotline for collection of information from local people, employing local people to participate in field patrols and investigations, meeting with representatives to address existing conflicts, and research on eco-friendly livelihoods for local communities. Also, local wildlife authorities undertake compensation for losses caused by snow leopards.	Significantly improved law-enforcement effectiveness with more information coming from local people and decreased revenge killing of snow leopards when local people tend to report to local wildlife authorities their losses caused by snow leopards.
Nepal, India (Ladakh), Pakistan, Russia	Corral predator-proofing. Predator-proof most vulnerable communally-utilized corrals that serve 10-30+ households; 2-5 structures per settlement in proven depredation hotspots. Ensure wire-mesh over roof, secure wooden door, barred windows.	Depredation losses from within corrals eliminated, resulting in improved perceptions by livestock owners and protection of 5+ snow leopards from risks of retributive poisoning or trapping. Notably increased willingness of community to co-exist with snow leopards.
Pakistan	Communally-managed daytime shepherding of vulnerable livestock in Khunjerab NP. Herders invest shared resources through fixed-fee payment or household rotation system.	Communal herding better allows for pastures to be rotated, thus helping reduce predation risk and lower grazing impacts.
Pakistan	Vaccination and livestock insurance. 15 villages, 30,000 heads of livestock vaccinated in 2013.	Controlled the outbreak of pox in two project valleys, reducing mortality rate to zero from pox.
Pakistan	In Baltistan, communally-managed and co-financed livestock insurance scheme. Funds for compensation contributed on 50:50 basis by villagers (through per animal fees) and sponsoring NGO (conditional grant).	Greatly increased tolerance of snow leopards, especially if complemented by income-generating initiative such as markhor trophy hunting program or tourism initiative
Russia	Western Tuva – protecting livestock corrals from snow leopards in Ubsunurskay Kotlovina NR. More than 70 herders in Tuva Republic were trained in the simplest means of strengthening corrals with the use of	Since then there has not been a single case of a snow leopard gaining access to a corral in western Tuva (before this 56% of all livestock killed by snow leopards in western Tuva died in corrals). As a result of this project, the

	metal mesh, and more than 40 corrals were protected from snow leopards in Mongun-Taiga and Bai-Taiga districts of Tyva Republic (about 1,500-2,000 km^2).	number of snow leopards south-western Tuva increased from 10-12 up to 15-20 individuals.

3.2 Managing habitat and prey

Intensify conservation efforts within large landscapes by identifying and **designating critical habitats** of key snow leopard populations as no-go areas for destructive land uses, maintaining their connectivity through **natural corridors**, and strengthening their **on-the-ground protection**. A landscape-level approach to snow leopard conservation that includes PAs and non-protected lands as well as transboundary landscapes is vital.

Specific activities for managing habitat and prey include developing management plans for model landscapes, creating new PAs and identifying corridors that link habitat and PAs. For example, returning grazing land to natural grassland has led to grassland recovery and prey increases in the snow leopard range in China, while new PAs in Kazakhstan have reduced human pressure on habitat, created local jobs and reduced poaching.

Photo 2. The Ukok Plateau Natural Park, Republic of Altai, a part of the UNESCO World Heritage Site. It provides critical habitat for the snow leopard and many other endangered species © Denis Bogomolov / WWF-Russia

Managing habitat and prey		
Country	**Good Practices**	**Brief Results**
Bhutan	Country-wide system of biological corridors connecting PAs	Contiguous snow leopard habitat of as much as 10,000 km^2.

China	26 nature reserves established covering about 50% of range areas of snow leopard populations; large-scale program to return grazing areas to natural grasslands implemented around range areas of snow leopard populations; research on measures to minimize negative impacts for connecting fragmented habitats started.	Most of the core areas for snow leopards have been under legal and actually effective protection while recovery of natural grassland ecosystems and increase of prey resources occurred in many former grazing areas.
Kazakhstan	Forest and Hunting Committee established six national parks in snow leopard habitat.	Additional jobs for locals were created, poaching has considerably decreased, and anthropogenic pressure on landscapes has decreased; security of snow leopard ecosystems has improved.
Mongolia	The Tost Local PA in Mongolia covers about 6,500 km2 - a quarter of which is good snow leopard habitat. Since 1990s many new PAs were established in potential snow leopard habitats.	Basis for protection of critical snow leopard landscapes from destructive land uses such as mining, dams, and other large-scale development projects. Today, 20 state PAs, which cover key habitats in Mongolia, harbor snow leopards.
Russia	Sailugemsky National Park (800 km^2) was established in 2010 in key snow leopard habitats in Argut River Watershed, Altai Republic.	Protection of snow leopard habitats; fighting snare poaching in key snow leopard habitats in Argut area.
Tajikistan	Establishing and/or supporting model community and private wildlife management and hunting areas.	Doubling of ibex numbers within four years and regular records of snow leopards; increase of markhor (in total 2012 directly observed >1,000), regular snow leopard observations, stabilization and local increase of Marco Polo sheep numbers; camera trapping has shown higher snow leopard abundance in managed hunting concession than in unassigned areas despite formal hunting ban in these.
India	Maintain community-managed reserves that rely on 'social fencing' to limit or exclude local use of the area based on a positive incentive program.	Tried in Spiti (3 sites) and Ladakh (2 sites) where recovery of prey (bharal and ibex in Spiti; argali and bharal in Ladakh) has been observed. Similar community-managed reserves have also been successful in Arunachal Pradesh in Tawang. The MoEF's Project Snow Leopard suggests a mosaic of such areas as an important approach to achieving landscape-level conservation.
India	Inaccessible and naturally well protected small PAs with negligible or no human use and well regulated, low intensity community-based ecotourism in small portions of the PA since 1983.	Tried in Nanda Devi and Valley of Flowers National Parks that brought remarkable improvement in the status of wildlife and their habitats. These two NPs act as control sites for long-term monitoring including climate change impacts.
India	Conflict mitigation and reducing antagonism and retaliatory killing of snow leopard. Corral Improvement: ca. 4,250 livestock; Insurance: over 180 households with ca. 600	Corral Improvement: Almost total elimination of losses. Insurance: Reduction in losses. Monetary compensation of losses: Slight

	livestock, overall area of over 1,000 km2. Compensation: direct compensation for livestock lost at 10% of the market price of the animal.	improvement seen in attitudes of people in about 10 years.

3.3 Combatting poaching and illegal trade

Combat poaching, illegal trade, and other wildlife crimes by **strengthening law enforcement**, **collaboration** among countries and international agreements/networks, and developing effective mechanisms for eliminating the illicit demand for illegal wildlife products.

Specific activities include building law-enforcement capacity through training and equipment, building community anti-poaching networks, and strengthening legislation and education to reduce illicit demand. Several good practices show how increased law enforcement and strong penalties for poaching and community anti-poaching networks and other means of engaging local communities can reduce poaching.

Combatting poaching and illegal trade		
Country	**Good Practices**	**Brief Results**
Afghanistan	Outreach, education, community governance building, and training and deployment of 55 community rangers across 11,000 km2 to monitor snow leopards and other wildlife, enforce anti-poaching regulations; building of predator-proof corrals to minimize conflict and retaliatory killing.	Snow leopard education intiatives in 14 of 15 schools in Wakhan; over 5,000 camera trap photos taken by community rangers; five snow leopards captured, collared, and monitored with community involvement; declines in poaching of snow leopards and prey; over 20 corrals built and no livestock loss in families using them.
Afghanistan	Survey identified international commmunity (development and military) as driver of trade; focused outreach aimed at development community; training at military bases on illegality of trade; government staff trained in CITES regulations and the processing of CITES permits; training in environmental laws, wildlife trade, and protected species given to 19 police stations in and around Kabul.	Removal of illegal trade items from base bazaars; training expanded to military bases and academies in US to educate military before deployment.
China	Chinese laws list snow leopard as a species under national key protection at first level and prohibit hunting of the species except for purposes of scientific research, public education, public security. Utilization of snow leopards must be approved with special permits while no permits are now issued for commercial purposes. Severe punishments from high penalties (10 times income) up to life in prison have been set by laws and regulations on illegal activities including poaching, illegal trade, etc. Authorities of forestry, public security, customs, commercial and industry	Currently in China, no evidence indicates the existence of organized poaching that targets snow leopard products. Also, there are no legal industries using snow leopard fur or bone for commercial purposes. Cases of poaching and illegal trade occur occasionally and arrested offenders have been sentenced and punished. Especially since 2011, illegal activities concerning snow leopards have clearly decreased.

	administration are legally responsible for legal investigation and law enforcement on the above illegal activities. Mechanism for governmental agencies to coordinate law enforcement established in 2011.	
Kazakhstan	Reducing poaching through substantial increase of penalties. Penalties for poaching a snow leopard (US$22,724) and all 5 subspecies of mountain rams (US$17,043). Total ban on their hunting.	Poaching of snow leopards and other rare species. has decreased. No cases of snow leopards poaching in Kazakhstan reported since.
Kyrgyz Republic	Gruppa Bars (brigade) for anti-poaching. Raids against poachers in all regions of the Kyrgyz Republic, especially in the north. In Naryn region, 35,000 km2 ,and in Issyk-Kul region, 25,000 km2 , are covered by the team, together with State inspection.	Reducing the official notice on the sale of skins of snow leopards, etc. At the moment, the Rehabilitation Center has only five snow leopards.
Mongolia	Two inter-agency irbis (snow leopard) anti-poaching teams were established in western Mongolia to conduct regular patrolling in snow leopard habitat.	As a result, the number of poaching incidents in 5 western provinces, in key snow leopard habitats decreased rapidly.
Pakistan	Reduce poaching through livestock vaccination programs. 3-5 livestock die of disease for every one killed by a wild predator, i.e., the economic loss to disease is much larger than to predation. More than 90,000 livestock vaccinated in 2012.	70-100% reduction in livestock mortalities. Increased cash income by selling more livestock. Increased meat consumption in the community. Increased tolerance for snow leopard. Reduced risks of diseases in wildlife.
Russia	Inter-agency anti-poaching brigades and regular snare removal campaigns in key snow leopard habitats. Two brigades were established in Altai and Sayan Mountains. They regularly patrol 1,500 km2 of key snow leopard habitats in Argut River Watershed, Altai Republic, and Sayano-Shushensky NR and its buffer zone, Krasnoyarsky Kray	Number of poacher snares in key snow leopard habitats in Sayano-Shushensky NR decreased from 800-900 to zero between 2008 and 2013. In Argut area, number of snares in key snow leopard habitats decreased from 500-800 (2008) to 50-100 (2013).
Russia	Development of small business program for local communities in snow leopard habitats as alternative to snare poaching. Two districts of Altai Republic: Kosh-Agach and Ulagan Districts, including parts of Onguday and Ust-Koksa districts (total area about 20,000 km2). Annually, 500-700 people are involved in the program.	Number of poaching cases in the area of activities decreased by at least 20% in comparison with 2010. Over 1,200 low-income people trained, over 70 people obtained micro-loans and grants and started their own biodiversityfriendly business. More than 200 new jobs for local communities were established.
Russia	Altai and Tuva Republics – Land of Snow Leopard Festivals. Schools of 5 districts in Altai Republic and 4 districts of Tuva Republic (1,500-2,000 people) annually are involved in these festivals.	Number of festival participants increased from 70 in 2010 to 2,000 in 2012. Festival became traditional event in Altai and Tyva Republics and involves many kids living in snow leopard habitats to learn more about value of snow leopards.

3.4 Transboundary management and enforcement

Increase **bilateral and regional cooperation** for snow leopard conservation in transboundary landscapes. This is a core principle of snow leopard conservation given the extent to which snow leopard habitat abuts national borders and the importance of maintaining large landscapes.

Many transboundary initiatives among snow leopard countries are in various stages of implementation already. Moreover, compendia of good practices in transboundary cooperation, especially management of transboundary PAs, are available; some snow leopard countries have also been pursuing transboundary management and enforcement for tiger landscapes, which can potentially be scaled up for snow leopard conservation.

Photo 3. WWF snow leopard anti-poaching unit in the Altan Khokki range, Khar Us Nuur National Park, Mongolian Altai, Mongolia © Hartmut Jungius / WWF

3.5 Engaging industry

Ensure that industry, infrastructure, and rural development programs and projects are fully sensitive to the conservation needs of snow leopards and their ecosystems, do not adversely affect or fragment key populations or critical habitats, and employ wildlife-friendly design and mitigation.

Engaging industry		
Country	**Good Practices**	**Brief Results**
Mongolia	The Nature Conservancy assessed mining impact for the southern Mongolian ecoregion, using indicator species.	Recommended areas for better protection.

3.6 Building capacity and enhancing conservation policies and institutions

Significantly strengthen the capacity of policy-makers, front-line managers, community leaders, and civil society for community-based conservation, effective law enforcement, and landscape management through supporting **knowledge exchange**, **communities of practice**, and **cooperation** among stakeholders.

Many specific capacity building activities are related to strengthening conservation-related legislation and policies through building awareness among government leaders and conservation department staff.

Building capacity and enhancing conservation policies and institutions		
Country	**Good Practices**	**Brief Results**
China	Snow leopard has been listed as a priority species for salvation in the National 12th Five Year Plan of Forestry Development and National Program for Wildlife Conservation and Nature Reserve Development while a special plan for protection of snow leopard populations and their habitats is underway for publication and implementation.	Investment in snow leopard conservation has been increased gradually and obvious growth can be expected in the not too distant future. Also, more attention has been paid to the species at concerned, different levels.
India	Initiated state-federal partnership Project Snow Leopard (PSL). Project Snow Leopard effectively covers five states, ca. 130,000 km2, innumerable villages and households. The Upper Spiti Landscape Management Plan under the PSL covers ca. 4,000 km2, ca. 40 villages, and ca. 7,000 people.	Positive numeric changes in wildlife numbers and people's attitudes in a few years' time are expected.

3.7 Research and monitoring

Evaluate and map current status of key snow leopard habitats and populations, **set baselines** against which to assess future change, conduct **economic valuation** of snow leopard habitats, and intensify **scientific research and monitoring** to inform future policy and action.

All snow leopard countries currently have at least some level of research and monitoring taking place, most importantly to set baselines against which to measure conservation progress and to adapt conservation planning and management as needed. Topics of planned research activities include but are not limited to movement ecology of snow leopards and prey, climate change impacts, population dynamics, and disease.

Photo 4. Snow leopard scratch traces in Yamaat valley in Turgen Mountains Strictly Protected Area.Uvs Province, Mongolia © Anton Vorauer / WWF

Research and monitoring		
Country	**Good Practices**	**Brief Results**
Afghanistan	Wakhan Corridor – ongoing camera-trap surveys of snow leopards; study of snow leopard prey; depredation survey; tracking of snow leopards using GPS collars, coupled with camera trapping.	Better understanding of snow leopard movement, habitat use, home range, and eventually population estimation.
China	Central wildlife authority arranged funding especially for monitoring and research on snow leopards, and appointed a chief expert to lead the project who holds training courses for local staff to undertake field monitoring or convenes meetings to collect information, analyze existing problems, and discuss activities for next steps each year.	Help wildlife authority to better understand the situation of snow leopard populations, habitats, and existing threats.
India	Understand snow leopard abundance along a gradient of prey biomass (Spiti). Understanding snow leopard diets along a gradient of domestic and wild prey ratios (Spiti).	Questions such as 'does increasing prey biomass lead to higher snow leopard abundance?'; 'does increasing livestock biomass lead to increased snow leopard abundance or is it the opposite?'; 'will conflicts increase with increasing livestock abundance?' will be answered. These studies, that use camera-trap based and molecular tools, are providing estimates of snow leopard assessments over large landscapes (ca. 2,000 km2). Estimated abundance in Spiti averages 0.64/100 km2.

India	Numerous studies to understand patterns of conflicts between local communities and snow leopards in different parts of the range.	These studies provide patterns of conflicts, including amount of losses, vulnerable livestock, vulnerable age classes, vulnerable pastures, etc. Ultimately they help in developing sound mitigation strategies.
India	Camera trapping studies in Ladakh, Uttarakhand, and Sikkim.	Density estimates for snow leopard and prey species.
Kazakhstan	State research program: the Committee on Science has started to finance the program of studying snow leopards at the Zoology Institute in Almaty, which was confirmed by the Ministry of Education and Science in 2012. Now the deep sectoral analysis of the economy for working out the final project of the "Green Economy" Strategy is being carried out.	Increased understanding of snow leopard populations and their habitats.
Mongolia	Threat reduction-based planning and monitoring protocol to monitor effectiveness of conservation programs. All villages in the landscape are included and all key areas of biological significance: snow leopard habitat, prey breeding and calving areas, and corridors.	Ability to establish better baseline data for snow leopards including population abundance, density, and life history parameters; emerging or unaddressed threats to snow leopards; evaluation of the ability of our programs to address/reduce/manage existing and ongoing threats.
Russia	Monitoring of key snow leopard population. Annual monitoring of key snow leopard metapopulations in Argut River Watershed, Chikhachev, Tsagan-Shibetu and Western Sayan Ridges on total area of about 1,500 km2 m. Since 2012, started snow leopard monitoring in Eastern Sayan Mountains: Tunkinsky Ridge (about 500 km^2).	Information on snow leopard distribution and abundance is annually collected for 4 key snow leopard populations in Russia to support conservation actions.

3.8 Building awareness

Communicate to citizens and various stakeholders, including local communities, youth, different branches and arms of the government, civil society, and the private sector about the value of snow leopards and their ecosystem. Each year, **awareness events** can be held around International Snow Leopard Day which takes place on October 23rd.

Building awareness		
Country	**Good Practices**	**Brief Results**
China	Snow leopard has been listed as a priority species for salvation in National 12th-5 Year's Plan of Forestry Development and National Program for Wildlife Conservation and Nature Reserve Development while a special plan for protection of snow leopard populations and their habitats is underway for publication and implementation.	Investment in snow leopard conservation has been increased gradually and obvious growth can be expected in the not too distant future. Also, more attention has been paid to the species at concerned, different levels.

India	Initiated state-federal partnership Project Snow Leopard (PSL). Project Snow Leopard effectively covers five states, ca. 130,000 km2, innumerable villages and households. The Upper Spiti Landscape Management Plan under the PSL covers ca. 4,000 km2 , ca. 40 villages, and ca. 7,000 people.	Numeric changes in wildlife numbers and people's attitudes in a few years' time are expected.

Photo 5. Children preparing for the Snow Leopard Festival in Ak-Shyrak, Kyrgyzstan © Andy Isaacson / WWF-US

4. Summary

Many good conservation activities and practices are being implemented across snow leopard range; however, these activities cover only a small percentage of the snow leopard's massive total range. Major opportunities exist for growth and scalability. One of the primary challenges and opportunities for the snow leopard conservation community moving forward will be to gain a better understanding of which conservation activities and combinations of conservation activities are most effective and thus most worth growing and scaling up.

As you develop your landscape management plan, try to learn as much as you can about the various conservation activities taking place in other parts of snow leopard range and see which activities might also be beneficial in your landscape. The conservation activities listed in this document are a good place to start but it is suggested that you do further research as there are many other snow leopard conservation activities taking place that are not listed here.

Incorporating Climate Change in Snow Leopard Landscape Management Planning

Advice Document Addendum to the General Guidelines for Climate Smart Snow Leopard Landscape Management Planning

Lead Author: Ryan Bartlett, (ryan.bartlett@wwfus.org), WWF, 1250 24th St NW, Washington, DC 20037, USA
Contributing Editors: Nilanga Jayasinghe (nilanga.jayasinghe@wwfus.org), Chris Czarnecki (chris@snowleopard.org)

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1. Background

Climate change is already having drastic effects across the high mountains and steppes of snow leopard range. Like the poles, the region often referred to as the "third pole" is facing some of the most dramatic warming and subsequent impacts of any region on earth. Rapidly increasing temperatures are melting glaciers and permafrost and changing local hydrology and vegetation patterns, while increasingly variable precipitation patterns are causing more frequent and intense extremes, from heat waves to high intensity storms and rapid fluctuations in between and resulting in more frequent natural hazards like drought, flooding and landslides. All of these are significantly impacting the unique ecosystems, wildlife, and surrounding communities throughout the region.

While there is evidence that the snow leopard might be resilient to some of these changes in the short term, there is so little information about its ecology that it is impossible to be certain how it will respond to the many changes already affecting its habitat[1]. The species itself may not be highly vulnerable now, but **climate change impacts on people living in and around its habitat throughout the range will nevertheless increase many of the threats it currently faces**, from habitat loss and encroachment to declines in prey base, retaliatory killings and poaching. In landscapes across the region, local communities are highly vulnerable to changes to ecosystem services that directly support their livelihoods, from grasslands for grazing and medicinal plants, to water provided by snow and glacier melt. When these are compromised by climate change, human-wildlife conflict can increase as people seek alternative livelihoods, including poaching.

Photo 1. Snow leopards often travel along ridgelines such as this one in India's Spiti Valley. Photo Credit: Nature Conservation Foundation / Snow Leopard Trust

Additional indirect threats of climate change will come through on-going economic development that, if managed unsustainably, can and will have major damaging effects in the landscape and worsen the

[1] http://assets.worldwildlife.org/publications/732/files/original/Snow_leopard_-_WWF_wildlife_and_climate_change_series.pdf?1435159228

impacts of climate change. Extractive and energy industries and their associated infrastructure, and unmanaged road development, for example, can increase existing erosion that will lead to further landslides as precipitation intensity increases with climate change. It is, thus, imperative for snow leopard management plans to tackle these issues in holistic, integrated ways that build resilience for communities, ecosystems and wildlife, without which threats to snow leopards will only grow in the future.

This document is intended to provide additional guidance in how to address the impacts and risks of climate change, as a supplement to the existing guidance framework developed by the Snow Leopard Trust, "*General Guidelines for Snow Leopard Landscape Management Planning*." As such, the recommended principles and step-by-step process described herein aim to cross-reference the relevant sections of the General Guidelines. For brevity, however, the document is largely limited to Part A: Situation Analyses. Part B: Management will be addressed in additional future supplemental guidance.

2. Key Principles of Climate-Smarting

Below are some basic principles to follow to ensure that the impacts and risks of climate change are properly accounted for in the landscape planning process, loosely based on guidance and principles from conservation organizations, the peer-reviewed literature, and learning from years of climate change adaptation planning for conservation. To be truly climate-smart, plans should:

- **Follow the premise that climate change is an unstoppable and inescapable force** that affects all biodiversity, communities, livelihoods and economic sectors in the landscape, albeit to different degrees, either directly or indirectly; and acknowledges that climate change can drive and change the nature of direct human threats to ecosystems, often synergistically exacerbating their impacts.
- **Use appropriately scaled (geographic and temporal) climate-related information to inform planning:** these include observed climate trends, near- and longer-term climate change projections, community perceptions of change, spatial mapping (GIS), and climate vulnerability assessments, among others.
- **Recognize that people are important parts of landscapes** and ecosystems and that human responses to the changing climate can have profound and negative consequences on biodiversity. Therefore, the landscape plan should be devoted to helping communities living in proximity with nature to adapt in ways that maintain, or at least do not undermine, ecosystems and their services and wildlife.
- **Manage (rather than avoid) uncertainty associated with climate change** and its impacts through the use of scenario planning—based on climate projection data—and other relevant tools, including those listed in more detail in the Key Resources section below.
- **Openly acknowledge information gaps and create plans to address them**, including through continuous monitoring and evaluation of ongoing climatic, biological, geophysical and socio-economic change, all of which have implications for management design and implementation.
- **Focused on the short to medium term (2020 to 2050),** while also planning for the longer term (2080) so that plans are flexible and adaptable as conditions change and new information becomes available.
- **Avoid maladaptation and prioritize "robustness"** so that near-term planned activities do not eliminate conservation and development options for the future that may be needed as the

climate continues to change. Activities do not reduce vulnerability of one interest at the expense of others (biodiversity vs community, community vs community, etc.)

- **Does not contribute to increased carbon-emissions** and better still, actively seek to reduce them.

These principles are not intended to be comprehensive, but if followed, should provide a strong foundation to ensure that the impacts of current and future climate change impacts and risks, both indirect and also direct, are explicitly considered in the planning and ultimate management of the landscape. The following steps guide planners in putting these principles into practice.

3. Steps for Climate-Smarting

While there is no universally accepted, peer-reviewed guidance for incorporating climate change impacts and risks into snow leopard conservation planning, the following steps developed through trial and error engagement with diverse stakeholders and landscapes around the world provide a foundation for creating a climate-smart snow leopard landscape management plan. As with the principles, they are not intended to be comprehensive, but rather a list of the most critical steps to begin to address climate change in landscape plans.

3.1 Assess the current climate

Assess the current climate and the importance of major seasons to different economic sectors, habitats and local communities through engagement with a diverse set of stakeholders, and as part of the collection of baseline information.

There are a number of tools and approaches to facilitate this process (see Key Resources below), but a particularly useful starting point is to **develop a seasonal climate calendar** for the landscape. In this exercise, ideally at a participatory workshop with local community members, or a more focused expert team, a 12 month calendar is placed on a wall, and using sticky notes, participants write important seasons for climate--e.g. snow season, monsoon season, dry season—and place them on the wall above or below the relevant month(s) where the seasons occur (this can also be done electronically in Microsoft Word, Excel or a similar program with a more focused team). This is then repeated with ecosystems and wildlife, culture, and socioeconomics and livelihoods (Figure 1). This process helps establish an important baseline of information that will be important later as the impacts of climate change are assessed for the landscape. At this point, it can be valuable to discuss how the climate might already be changing and what it would mean for each of the above major areas: ecosystems and wildlife, socioeconomics and culture (For more information about each step, see Appendix 1).

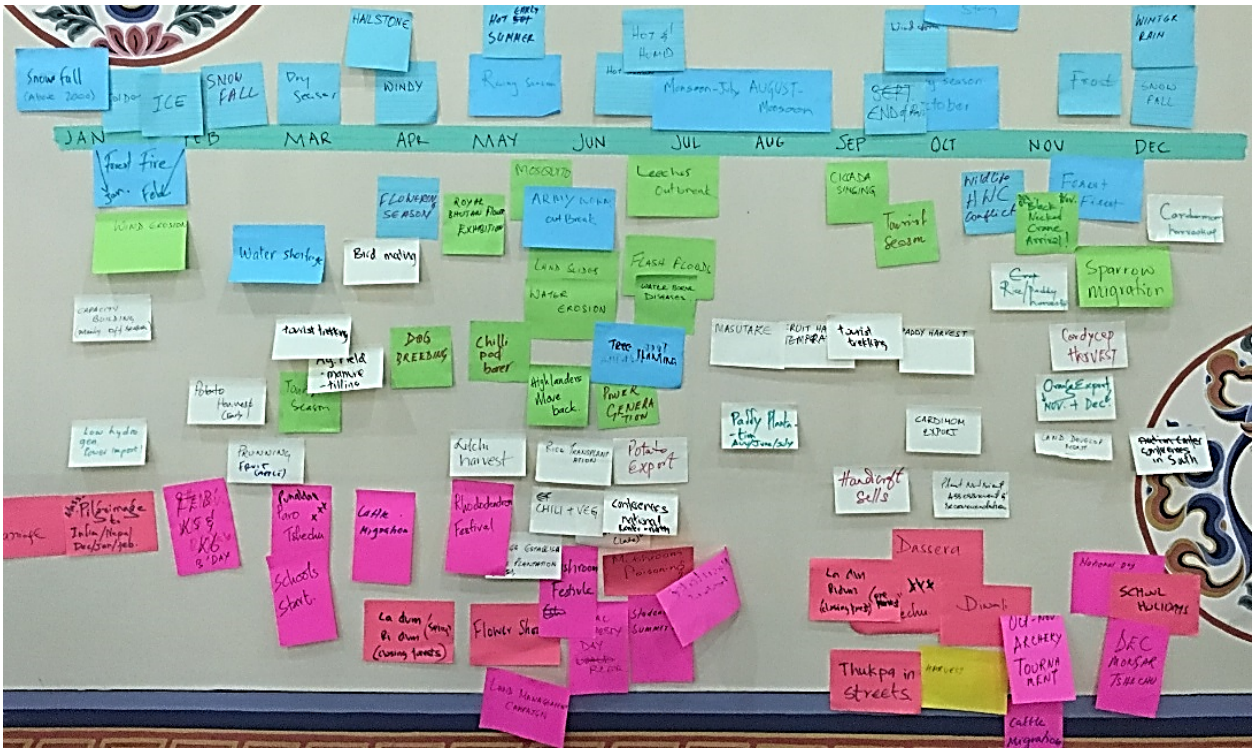

Figure 2. Example Seasonal Calendar. Months are listed across, with different seasons posted in different colors: climate in blue, environment in green, cultural in yellow and socioeconomic in pink.

3.2 Assess recent climate trends and future climate

Assess recent climate trends and future climate using available data and tools, including participatory approaches with local communities and local and global datasets, and accounting for uncertainty, all tailored to specific landscape needs.

With baseline information on current climate patterns established, the next step is to analyze local and global data to determine how the climate is changing. Ideally, this is done by experts who can use the seasonal calendar to guide their analysis, particularly in choosing which seasons to assess historically and model for the future. Local weather station data with preferably 30 years of measurements in temperature and precipitation at a daily time-step should be collected and analyzed for three important reasons: 1) it is real, observed data, so is less biased than analyses generated by downscaled global models; 2) it allows for analysis of how often extreme events—high intensity storms, droughts, high temperatures—occur in the landscape and if they are increasing in frequency and intensity, which is critical information for landscape planning; and 3) because such data is observed, rather than modeled, it can be used to increase the accuracy of the modeled future climate projections.

Projections of the future climate should be tailored to the local climate and seasonal calendar, answering the question of how the climate is likely to change during priority seasons in each landscape; e.g. during the monsoon and dry seasons of the eastern Himalaya. **It is also important that these projections be produced to depict a *range of future scenarios for specific seasons, not a single average annual estimate***. Because the models are inherently uncertain and will depict considerable uncertainty across the entire snow leopard range, and due to complex topography that makes downscaling models

difficult, they should only be used to show a range of future possibilities, not indicate false certainty in one number as the model average would (See Table 1 below). Good practice here is to focus on projections for seasons, rather than annual averages, which provide much less useful information and less clear trends. It is much more important to plan for multiple possible futures using a scenario planning approach, particularly for changes in precipitation that are far more uncertain, than to overly rely on one average number for planning.

	2011-2040	2041-2070
Summer	-3 to +26%	+8 to +40%

Table 1. Example Climate Projections: Future Change in the Summer Monsoon, Eastern Nepal. Defining the ranges: the low estimate represents the 25th percentile and the high estimate the 75th percentile of 42 model runs, with 21 models run for two Representative Concentration Pathways (RCPs), 4.5 and 8.5 to represent low and high estimates of climate change.

The selection of which variables to model and ultimately use for the planning process in the next step is also critical: for higher altitude mountain ranges of the snow leopard range, in many cases, **the daily minimum and maximum temperatures, rather than the average, are often more valuable for assessing the impacts of climate change**, as they reveal more about important aspects of the seasonal calendar like for example spring thaw and snow melt, or high temperatures that might limit crop productivity.

Because such technical assessments often cannot be carried out for a variety of reasons—insufficient local data, lack of resources—and due to their often high degree of uncertainty, it is important to take additional approaches and tools that require less technical expertise, but are also still important information sources. These include stakeholder workshops with local community members to collect local perceptions as to how the climate has changed compared to recent decades, and how people typically respond and how this might affect surrounding wildlife and ecosystems (see Appendix 2). It is, therefore, critical to ensure that questions about climate change and how people and ecosystems in the landscape respond are included in all community interviews and assessments. There is also likely to be at least some publicly available information on changes in the landscape and how they affect livelihoods, ecosystems and wildlife, including in the peer-reviewed literature and national communications to the United Nations Framework Convention on Climate Change (UNFCCC) or National Adaptation Program of Action (NAPA) reports, both of which often contain historical analyses and future projections (see more information in the Key Resources section below). For spatial analyses in the landscape, there are numerous freely-available sets of spatial climate data (see WorldClim in Key Resources below), but this is less optimal than primary analysis of climate change risk information directly tailored to the needs of the landscape planning process.

3.3 Build future climate scenarios

Build future climate scenarios and assess impacts and responses of people, ecosystems and wildlife using all available information sources on trends and projections in temperature and precipitation for the landscape.

Once information on climate trends has been gathered—in all forms, whether community surveys, national reports or technical assessments, including climate and spatial models—the next step is to develop future climate scenarios. This is a particularly important step in landscapes of the snow leopard

range due to very high levels of uncertainty in climate models that struggle to accurately depict the very complex climates of central high Asia because of step topography and lacking historical data. This approach, called scenario planning (see more information in the Participatory Tools section below), helps to address scientific uncertainty about future changes by allowing stakeholders **to plan for a *range of possible future climates***.

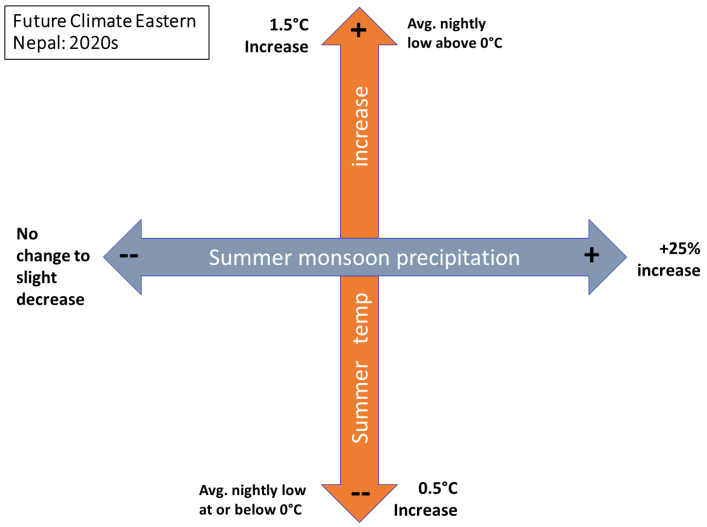

Figure 2. Example Climate Scenarios: Eastern Nepal

Ideally, this step is carried out during a participatory workshop, as it will require considerable expertise from a broad coalition of stakeholders—biologists, climate and spatial mapping experts, local community leaders, among others—to determine exactly how these changes in future climate will affect the landscape, but it can also be done in a small team with the right expertise. Scenarios are typically divided along two basic axes to create at least four scenarios, one for each quadrant (see Figure 2 above). With the climate in each quadrant generally defined—e.g. rapid warming and declining summer precipitation in the upper left, the major changes and resulting impacts on people, ecosystems and wildlife are discussed and outlined: for example, increasing drought extremes will lead to increased poaching of wildlife as agriculture becomes a more difficult livelihood.

These changes, and their potential threats to ecosystems and wildlife in the landscape, are then discussed in detail in the Threat Analysis process (see Addendum 1: Strategic Management Planning in Snow Leopard Landscapes), which helps landscape planners identify key threats to be addressed in the management plan (see Part B: Management in the main text). At this stage, it is also ideal to overlay development scenario axes on top of climate change scenarios as well, to help determine how economic development in the landscape might interact with climate change to produce potentially larger or more damaging impacts on surrounding ecosystems. These interacting effects (also known as indirect effects) on key conservation and development targets are then prioritized in the management plan (see Addendum 1: Strategic Management Planning in Snow Leopard Landscapes).

3.4 Incorporate climate change impact information (threats) and climate scenarios into the landscape plan

The information summarized for each of these scenarios serves as a critical resource for planners as they move forward; it should be used as a resource to regularly guide activity planning throughout the landscape, i.e. in informing Part B: the Management Plan. As the management plan is written, many new activities may be required to address climate change impacts and risks, including:

- additional **vulnerability or adaptive capacity assessments for communities** throughout the landscape (beyond those that may have already been assessed; see Climate Crowd and CVCA in Key Resources below)
- **vulnerability assessments of snow leopard prey species** and their food sources
- **vulnerability assessments at the landscape or river basin scale** to connect community and species vulnerabilities to larger risks and impacts up- and downstream
- gathering **more weather data by installing weather stations** or engaging communities in weather monitoring
- **additional climate projections** as science improves
- **additional research identified in the peer-reviewed** literature on snow leopard climate vulnerability, including improving understanding of genetic diversity among populations, monitoring for new pests and disease outbreaks, and changes in behavioural responses as climate change impacts worsen (see Snow Leopard Climate Vulnerability Assessment in Key Resources below).
- **adaptation interventions identified by communities:** as many of the high altitude communities are subsistence pastoralists or small-scale farmers, many interventions will need to focus on improved grazing practices to address changing vegetation patterns and improved agriculture practices to reduce vulnerability to hydro meteorological variability and hazards like droughts and flooding.
- **monitoring and learning plan with communities** to assess the efficacy of adaptation interventions and identify changes if needed, especially if vulnerability has unintentionally increased and has led to increased unsustainable natural resource exploitation
- **revised species management plans** to account for direct and indirect effects of climate change on snow leopards, their prey base and other important wildlife in the landscape
- **review of external conditions** that promote or hinder the implementation of these new aspects of the plan. Identify and advocate for needed policy changes with governments and donors.

Following the principles above about adaptive management, it is important to recognize that once these steps have been completed, the process is not complete; **plans should be continually revised as new information on climate risks and impacts is reassessed**, perhaps every 5 years, if not more frequently.

4. Key Resources

There are hundreds of tools available that could be useful for the landscape planning process to address the impacts of climate change. Rather than try to include them all here, only a limited few are listed

below that are most relevant to incorporating climate risk into integrated landscape plans across the snow leopard range.

4.1 Participatory Tools

1. Climate Vulnerability and Capacity Analysis (CVCA): This method developed by CARE provides guidance and additional tools to assess how communities are responding to climate change. This tool, while very useful at the community scale, is very focused on community well-being and not necessarily the surrounding environment, so it is important to modify the approach to include questions in community surveys specifically about reliance on surrounding ecosystems and their services (i.e. grazing habitat, medicinal and aromatic plants, freshwater supplies, timber, etc.) and any interaction with snow leopard populations or their prey base. [http://careclimatechange.org/tool-kits/cvca]
2. Climate Crowd: a local survey tool for assessing how local communities respond to climate change impacts and extreme events, and how that response affects local biodiversity (see survey draft in Appendix 2). [www.wwfclimatecrowd.org]
3. Scenario Planning: first outlined by Peterson et al. in 2003, this approach allows for planners to account for uncertainty in future climate trends and projections by planning for multiple future scenarios. [http://onlinelibrary.wiley.com/doi/10.1046/j.1523-1739.2003.01491.x/full]

4.2 Climate Vulnerability Assessments

1. Documents submitted by national governments to United Nations Framework Convention on Climate Change (UNFCCC), including Intended Nationally Determined Contributions (INDCs), and National Adaptation Plans and Programmes of Action (NAPs, NAPAs). [http://unfccc.int/adaptation/items/4159.php]
2. WWF Snow leopard climate vulnerability assessment: a tool developed by WWF-US species and climate experts, this is a trait-based assessment of factors from the peer reviewed literature that assess the entire species' climate vulnerability. [http://www.worldwildlife.org/pages/snow-leopards-and-climate]
3. Climate Vulnerability in Asia's High Mountains (WWF): A 2013 review of the latest peer-reviewed and grey literature on climate change impacts and vulnerability across central Asia's major mountain ranges. [http://www.worldwildlife.org/publications/climate-vulnerability-in-asia-s-high-mountains-how-climate-change-affects-communities-and-ecosystems-in-asia-s-water-towers]
4. Guardians of the Headwaters (WWF): A 2013 map book analysing climate change across the snow leopard range, including potential impacts to habitat extent based on tree line shift, and additional impacts on water supplies due to increasing aridity. [http://www.worldwildlife.org/publications/guardians-of-the-headwaters-snow-leopards-water-provision-and-climate-vulnerability]
5. Peer-reviewed academic research: Google Scholar is an excellent source for searching for academic research on climate change impacts in each landscape, but paid access is often

required to read full articles, and articles are largely limited to English. [https://scholar.google.com/]

4.3 Other Climate-Smarting and Mainstreaming Guides

1. U.S. Fish and Wildlife Service, "Climate-Smart Conservation: Putting Adaptation Principles into Practice," provides a comprehensive guide for addressing climate change in the entire planning and management cycle. [https://toolkit.climate.gov/tool/climate-smart-conservation-putting-adaptation-principles-practice]

4.4 Climate and Other Relevant Spatial Data

1. Worldclim: freely available spatial climate data already in raster format, downscaled to 1km resolution, including from the most recent IPCC 5th Assessment Report (AR5) CMIP5 models. [http://www.worldclim.org/]
2. WRI Aqueduct: global depiction of risk to water supplies, including seasonal and annual variability. [http://www.wri.org/our-work/project/aqueduct]
3. Third Pole Geolab: an interactive mapping site that summarizes a series of maps and review of the climate literature for Central Asia, highlighting the connections between snow leopard habitat, climate change and water provision. The site is also home to a GIS data repository containing relevant spatial data for the region. [http://www.thirdpolegeolab.org/]

Appendices

Appendix 1. Understanding Your Climate: Creating a Seasonal Calendar

Understanding Your Climate

Developed by Shaun Martin

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Objective: We often discuss climate change as if we already thoroughly understand the historic climate its role in local ecology, culture, and economies. It is difficult to understand change if we do not understand where we are starting from. Through this participatory exercise, participants will use their current knowledge to jointly develop a visualization of the historical annual climatic cycle for their region of interest (usually where they live or work). This activity also helps facilitators and trainers to better understand the climate of a region that they may be unfamiliar with. This will be helpful in facilitating subsequent discussions about local climate change.

Background: This is a fast-paced, fun collaborative exercise where all participants work in a single group. This activity should be conducted at the beginning of a workshop, before formal presentations begin. If participants already know one another very well, it can be used instead of an ice-breaker. The visualization of the climate can remain on the wall for the duration of the workshop to refer back to when necessary.

Time required: About 30 minutes.

What is needed:

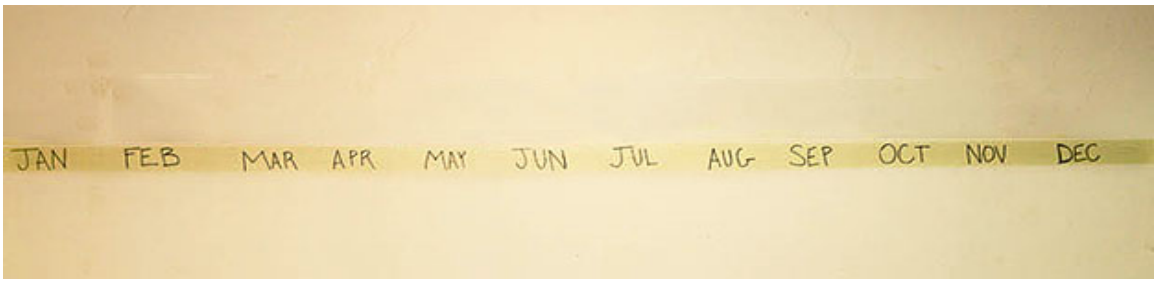
- About 5-6 meters of masking tape about 10 centimetres wide
- Plenty of large coloured sticky notes in at least 2-4 colours
- Plenty of thick-tipped Sharpie pens or magic markers
- A clean wall at least 5-6 meters long

Preparation:

This activity requires set up before participants arrive at the meeting venue. Set up takes about 10-15 minutes. Begin by placing the masking tape horizontally along the wall in a single line about 5-6 meters long. If your masking tape is less than 10cm wide, you can place 2 or 3 strips of masking tape on the wall to form a single strip of sufficient width. The tape should be place at a height where most participants can reach comfortably above it leaving plenty of space below it.

With a black thick-tipped Sharpie or magic marker, write the months of the year evenly spaced across the masking tape, starting with January on the left and ending with December on the left. You may use abbreviations for months like JAN, FEB, DEC, etc.

Your “climate calendar” should look something like this:



Distribute large colored Sticky Notes in all colors you have available and several Sharpies or magic markers at each table.

Explain to the participants the objective of the exercise as described above. Participants will use the colored sticky notes and Sharpies to build a visualization or "climate calendar" based on what they believe their historical (and usually current) climate to be.

Begin selecting a single color Sticky Note and have participants write down seasons and climate-related events using their Sharpies. They may also draw pictures of the seasons and events if they prefer. You can prompt thinking by suggesting a few seasons to start. For example, "When does the rainy season start?" Someone may respond, "In April." Have the participant write or draw a picture of "rainy season" on a Sticky Note and have them place it above "April" on the wall.

Continuing with this example, "When does the rainy season end?" Someone may respond "In June." Have that person write or draw "rainy season" on a Sticky Note and place it above June on the wall. Have another person write or draw "rainy season" and place it above May so that all months of the rainy season are identified as such.

Then ask participants for other seasons of the year. For example, "dry season," "hurricane season," "monsoon" or "cold season." By now participants should be writing the seasons and climate-events on their own. As they place it on the wall, they should verbalize it to the group. If more than one person writes the same season, have them place the second Sticky Note above another month for that season until all months with that season are identified.

Once participants have run out of seasons to identify, review the calendar to make sure all seasons have been identified and everyone agrees on the timing of seasons as represented on the wall. At this point, the climate calendar should look something like this:

In the next step, following the same process above, participants use different colored Sticky Notes to represent various ecological, social and economic processes and events and place them in the appropriate months below the calendar. If you have enough colors of Sticky Notes, choose one color for ecological processes, another for social events and a third for economic activities. If you have only two colors, combine social and economic activities. You may want to start with a single theme or you can do all three simultaneously. You can start the activity by giving various examples of each of the 3 themes.

Ecological

- bird migrations (departures and arrivals)
- fish spawning aggregations
- breeding seasons for various terrestrial species
- flowering and fruiting of important plants

Social

- important festivals and celebrations
- start and conclusion of the academic year
- start of the government fiscal year and budgeting season (particularly for government groups)
- holiday period for workshops

Economic

- planting and harvesting seasons
- tourist season
- logging season
- fishing and hunting seasons

At this point in the activity, one person's ideas lead to many others bringing up new ideas and the calendar can get full very quickly. Let this process happen without interruption. When no one has anything more to add, review the calendar on the wall with the entire group starting with January and moving through the entire year. You might want to make observations as you go along and ask questions to clarify things you might not understand that will be useful in later discussions during the workshop.

As a last step, explain again to your participants what they have created – a calendar that shows links between the climate and ecological, social and economic processes and activities. Our way of life has evolved around the premise of a stationary climate. Explain that climate change means that the climate-related seasons on the wall above the calendar are shifting. Take one Sticky Note, for example, "rainy season" above April, and move it to another month or remove it from the wall altogether. Ask, "What happens to everything below the calendar if the rainy season shifts so that starts earlier or later or is shorter or disappears altogether?" This is what we will explore in this workshop.

If you are able to keep the calendar on the wall for the rest of the workshop, you can use it to show changes in local climate during presentations on freshwater, marine, forests, etc.

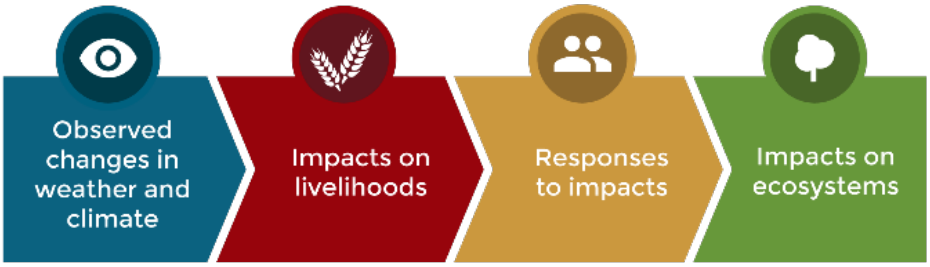
Appendix 2. Survey: Assessing Human Responses to Climate Change and Potential Impacts on Biodiversity

WWF Climate Crowd

www.wwfclimatecrowd.org

Community survey on human responses to climate change
and subsequent impacts on biodiversity

Far removed from decision-making bodies and financial resources, rural communities in developing countries are often left to their own devices to cope and adapt to changes in weather and climate. Because coping strategies and autonomous adaptation responses go largely undocumented, we miss important opportunities to learn from the experiences of these communities and integrate learning into planning efforts.



The aim of this research is to investigate the nature of any changes in weather and climate, how rural communities are responding to these, and the effect of these responses on biodiversity. Key informants – or community leaders with positions of responsibility – should be sampled – but they are being asked to give their answers based on the community as a whole, not just themselves.

There is inequality between men and women in communities. This research is gender-sensitive, meaning it recognizes these differences and makes an effort to hear the voices of men and women. Women and other disadvantaged groups should be proactively sought for participation. In order that women feel able to speak freely, they should be interviewed by female researchers. There is a box to tick whether or not a man is present in interviews with women. Such presence may impede a woman's ability to express herself freely, and cause her to present the views of the powerful, even if she does not agree. It is thus important for valid analysis for us to know whether or not this is the case.

This survey contains a mixture of closed-answer questions (where there is a yes/no answer, or a box to tick) and open-answer questions. In the open answer questions please probe the issue with your respondents so you are satisfied that you have a valid picture of the situation. Some potential examples are provided to form the basis of discussion, but this is by no means exhaustive. New findings – beyond these examples – will particularly add to the research impact. For example, if one response to a decline in crop yield is to gather wild resources, you could ask more about the resource being collected. Is it in a

protected area for example? Such detail will help us to know more about the specific nature of responses, and how they vary from place to place.

The survey comprises 4 sections:

A. Background information
B. Changes in weather and climate
C. Impacts of changes in the weather, climate and responses to these changes
   C1 Crop yield
   C2 Livestock production
   C3 Fish catch
   C4 Human health
   C5 Natural resources, e.g. water, wood
   C6 other responses
D. Impacts of responses on biodiversity

In your introduction, explain that you are interested to see if (s)he has seen any changes in weather and climate and, if so, what the effects of these have been on livelihoods, and how people are responding to them. Explain that the results of the survey will remain anonymous, and that your respondent has the right to refuse to participate or withdraw at any time. Please apply a questionnaire reference in the first box – we suggest your first and last name, and a sequential number e.g. Jane Smith 1; Jane Smith 2; etc. This identifying reference is important during the analysis of data.

Once collected, please submit all data at https://www.wwfclimatecrowd.org/form
Contact Nikhil.advani@wwfus.org for any questions

Questionnaire reference					
Interviewer's name		**Interviewer's sex**	M	F	
Interviewer's organisation		**Country**			
Date		**Village**			
Time started		**Time ended**			
GPS Location					

A. BACKGROUND INFORMATION

A1 Respondent's role *(e.g. farmer, park ranger, village leader, etc.)*						
A2 Main livelihood(s) in village *(e.g. farming, livestock, fishing, trading, etc.)*						
A3 Respondent's sex	M	F	**A4 If the respondent is a woman, is a man present during the survey?**		Y	N
A5 How many years have you lived in this area?	Less than 1 year		1 – 5 years	6 – 10 years	>10 years	
A6 What is your age?	18 – 35		36 – 53	54 – 70	>71	

B. CHANGES in WEATHER and CLIMATE

Try not to lead by simply asking the questions as they appear in the questionnaire. Rather engage the interviewee in conversation about different aspects of the weather and, if you are not certain of their answer/ if it is not obvious from your conversation, then ask them to clarify e.g. After a chat about rainfall, "so, do you think rainfall is staying the same or increasing or decreasing? What about timing?"

(Circle the correct answer, and you may circle more than one.)

B1 Have you noticed changes in temperature?	No / Stayed the same	Hotter	Cooler	More variable	Don't know
B2 Have you noticed changes in the amount of rainfall?	No / Stayed the same	More	Less	More variable	Don't know
B3 Have you observed changes in the timing of the rainy season?	No / Stayed the same	Earlier	Later	More variable	Don't know
B4 Have you observed changes in how often floods occur?	No / Stayed the same	More frequent	Less frequent	More variable	Don't know
B5 Have you observed changes in how often droughts occur?	No / Stayed the same	More frequent	Less frequent	More variable	Don't know
B6 Have you observed changes in wind patterns?	No / Stayed the same	More	Fewer	More variable	Don't know
B7 Have you observed any changes in landslides	No / Stayed the same	More	Fewer	More variable	Don't know
B8 Have you noticed any changes in ice or permafrost melt?	No / Stayed the same	More	Less	More variable	Don't know
B9 Have you noticed any change in sea level?	No / Stayed the same	Higher	Lower	More variable	Don't know

If any of section C1-6 is not relevant, for example in a fishing-dominated village there may be no livestock production, please skip and write not relevant.

C. IMPACT of CHANGES in WEATHER and CLIMATE and RESPONSES

C1 Crop Yields

C1a Has there been a change in crop yields?	Decrease	Stayed the same	Increase

C1b Which of the changes in weather and climate have played a role?	**C1c What have been the specific impacts on crop yields?** e.g. increases in pests and diseases, increased sun exposure burning crops *(Elaborate the nature of the change with as much detail as possible. The examples are merely indicative)*

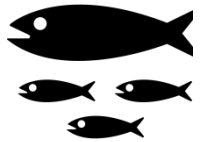
C1d How have people responded to these impacts? e.g. change in farming practices, change in farming location, water management, disease/pest management, diversifying livelihood, use of natural resources, etc.	

C1e Have these responses had impacts on biodiversity?	Yes	No	*(See section D to add more detail)*

C. IMPACT of CHANGES in WEATHER and CLIMATE and RESPONSES
C2 Livestock production

C2a Has there been a change in livestock production?		Decrease	Stayed the same	Increase
C2b Which of the changes in weather and climate have played a role?		**C2c What have been the specific impacts on livestock production?** e.g. greater deaths, loss/gain in production, health, changes in fodder/water availability, increases in pests and diseases *(Elaborate the nature of the change with as much detail as possible. The examples are merely indicative)*		
C2d How have people responded to these changes? e.g. change in livestock practice, water management, disease/pest management, change in location, natural habitat encroachment, use of natural resources, illegal hunting, diversifying livelihood, etc.				
C2e Have these responses had impacts on biodiversity?		Yes	No	*(See section D to add more detail)*

C. IMPACT of CHANGES in WEATHER and CLIMATE and RESPONSES
C3 Fish catch



C3a Has there been a change in fish catch?	Decrease	Stayed the same	Increase

C3b Which of the changes in weather and climate have played a role?	C3c What have been the specific impacts on catch? e.g. total catch, size of fish caught, type of fish caught *(Elaborate the nature of the change with as much detail as possible. The examples are merely indicative)*

C3d How have people responded to these changes? e.g. change in fishing practice, catch other species, diversifying livelihood, change in location, natural habitat encroachment, use of natural resources, etc.	

C3e Have these responses had impacts on biodiversity?	Yes	No	*(See section D to add more detail)*

C. IMPACT of CHANGES in WEATHER and CLIMATE and RESPONSES
C4 Human health

C4a Has there been a change in human health?	Worsened	Stayed the same	Improved

C4b Which of the changes in weather and climate have played a role?	**C4c What have been the specific impacts on human health?** e.g. who has been affected, any particular diseases, have new health conditions emerged, are people living longer/dying earlier *(Elaborate the nature of the change with as much detail as possible. The examples are merely indicative)*

C4d How have people responded to these changes? e.g. disease management, working earlier or later in the cooler parts of the day, change in location, diversifying livelihood, etc.	

C4e Have these responses had impacts on biodiversity?	Yes	No	*(See section D to add more detail)*

C. IMPACT of CHANGES in WEATHER and CLIMATE and RESPONSES

C5 Natural resources

C5a Has there been a change in availability of natural resources, e.g. water, wood?	Decrease	Stayed the same	Increase

C5b Which of the changes in weather and climate have played a role?	**C5c What have the impacts been on natural resources, e.g. water and wood?** e.g. traveling further for firewood, traveling further for water, using alternative species for fire (including protected/slow-growing species), reduction in the variety and/or size of wild animals to eat, any animal species no longer seen, reduction in availability of wild fruits *(Elaborate the nature of the change with as much detail as possible. The examples are merely indicative)*

C5d How have people responded to these changes? e.g. natural habitat encroachment, illegal hunting, change in livelihood location, diversifying livelihood, water management, etc.	

C5e Have these responses had impacts on biodiversity?	Yes	No	*(See section D to add more detail)*

C. RESPONSES to the CHANGES in the WEATHER, CLIMATE

C6 Other responses

This question provides an opportunity to investigate if there have been any other general responses to changes in weather and climate that are not specific to the categories above *(Fill in with as much detail as possible)*

C6 Have there been any other ways people have responded to changes in the weather, climate and nature environment? e.g. migration, borrowing, reliance on NGO/government support, selling assets	

D. IMPACT of RESPONSES on BIODIVERSITY

The intention here is to investigate whether any responses to changes in weather in climate are having knock-on effects on biodiversity (local wildlife and ecosystems). In some cases, this will be obvious from the impacts and responses outlined in **section C**, and so you will be able to fill these in yourself. In other cases, the respondent may not explicitly point to the impact of responses on biodiversity – particularly if it is negative. However, with your knowledge you may be aware of the implications for certain responses, and so can further probe these. For example, if it has been mentioned that livestock are now roaming a protected area, you can specifically probe issues such as increased human-wildlife conflict, and change in wildlife populations, as a result *(Circle the Y/N. If Y, fill in the box with as much detail as possible)*

D1a Have any of the responses led to increased human-wildlife conflict?	Y / N	**D1b Which response(s)?** **How?**
D2a Have any of the responses led to increased competition (with other people and with wildlife) for resources such as water, food and land?	Y / N	**D2b Which response(s)?** **How?**
D3a Have any of the responses led to increased wildlife mortality?	Y / N	**D3b Which response(s)?** **How?**
D4a Have any of the responses led to wildlife moving to/	Y / N	**D4b Which response(s)?** **How?**

away from communities?		
D5a Have any of the responses led to increased land degradation?	Y / N	**D5b Which response(s)?** **How?**
D6a Have any of the responses led to changes in water supply?	Y / N	**D6b Which response(s)?** **How?**
D7a Have any of the responses led to other impacts on local environment and ecosystems?	Y / N	**D7b Which response(s)?** **How?**

Mapping to Support Snow Leopard Landscapes Management Planning

Advice Document Addendum to the General Guidelines for Climate Smart Snow Leopard Landscape Management Planning

Lead Author: Ryan Bartlett, (ryan.bartlett@wwfus.org), WWF, 1250 24th St NW, Washington, DC 20037, USA
Contributing Editors: Jessica Forrest (jforrest714@gmail.com), Nilanga Jayasinghe (nilanga.jayasinghe@wwfus.org), Chris Czarnecki (chris@snowleopard.org)

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1. Background

In 2013, the twelve Snow Leopard Range Countries made a groundbreaking pledge to "protect and recover snow leopard populations and their fragile habitats" (Snow Leopard Working Secretariat 2013a).

A number of strategies outlined in the Bishkek Declaration on the Conservation of the Snow Leopard and subsequent work streams are spatially explicit. For example, countries resolved to "map the current status of key snow leopard populations and habitats to set baselines and indicators against which to assess future change". They unanimously agreed to secure 20 snow leopard landscapes by the year 2020 (the definition of which has spatially explicit components) (Snow Leopard Working Secretariat, 2013b). At a meeting in the Kyrgyz Republic in June 2014, countries further agreed to seven criteria of secure snow leopard landscapes. Among these criteria are designated "critical wildlife areas and corridors, where damaging land use is minimized" and "multiple use zones", where a broader array of stakeholders and development opportunities are allowed (GSLEP, June 2014) (see Appendix 1).

The implementation of these strategies necessitates GIS mapping. In order to produce meaningful management insights, it is necessary to map:

- snow leopard habitats and movement areas
- ecosystem services and their long term vulnerability
- areas at risk from climate change and human development

These and other layers (on prey, sensitive habitats, future development plans, etc.) can inform the delineation of management zones.

The following document provides optional guidance for producing GIS layers for the management zoning process in snow leopard landscapes. There are numerous approaches that can be used, and this provides a grab bag of suggestions that can be customized based on needs and capacity in a given landscape. A sample work plan is provided as Appendix 2.

Photo 1. Snow leopard landscape. Photo Credit: Nature Conservation Foundation / Snow Leopard Trust

2. Required Resources

1. **Advanced GIS expertise**: expert familiar with data processing, advanced raster analysis, mapping standards, and some cartography
2. **Any GIS software**: which can be ArcGIS, Q-GIS, or any other modern software as preferred by the GIS-expert, including computer resources (data storage)
3. Guidance from GSLEP network in **mapping standards**, in order to communicate consistently on snow leopard conservation throughout the snow leopard range
4. **Support from experts** on wildlife behavior, habitat modeling, ecosystem services, water resources, and climate change projections
5. **Time allowance** to be working on the maps: depending on the availability of data, this allowance can range to a couple of days, to weeks or even months

3. Summary of GIS Layers to Inform Snow Leopard Landscape Management Planning

1. The extent or boundaries of:
    a. the snow leopard landscape for GSLEP (i.e., the management landscape)
    b. the snow leopard habitat analysis (present and under climate change)
    c. the water analysis (present and under climate change)
2. Snow leopard habitat and movement between habitat blocks (ecological maps)
3. Ecosystem services, such as water provision, carbon, etc.
4. Climate change layer for snow leopards (climate envelope) or biodiversity (land facets)
5. Climate change layer for ecosystem services, i.e. how services will change with projected increase in temperature or change in precipitation patterns.
6. Current human pressures (roads, settlements, and others as availability)
7. Future human pressures, such as planned infrastructure and projected population growth
8. Current and proposed management zones (protected, community etc.)
9. Other wildlife, biodiversity and ecological values

Once all layers are available, they can be overlain in a GIS. Raster approaches or manual delineation can be used to create ecological and/or physical zone maps of the region, based on aspects such as ecological sensitivity. An ecological zonation can then inform a management map (see Figure 1 and Appendix 3).

> **Critical Wildlife Areas** – Areas with higher wildlife, snow leopard, and/or biodiversity values than surrounding areas within the landscape. These areas also have low human density or a community willing to collaborate in conservation. This area would largely be a no-go zone for new infrastructure development.
>
> **Multiple Use Zones** – Areas with lower wildlife density and greater human footprint than Critical Wildlife Areas, but still possible for snow leopards and other wildlife to live in and/or cross.

While communities here are willing to collaborate in conservation, other stakeholders may be engaged as well, in the appropriate development of 'smart green infrastructure" and other conservation activities. Other stakeholders include businesses and government departments typically focused on human development, infrastructure, and service provision.

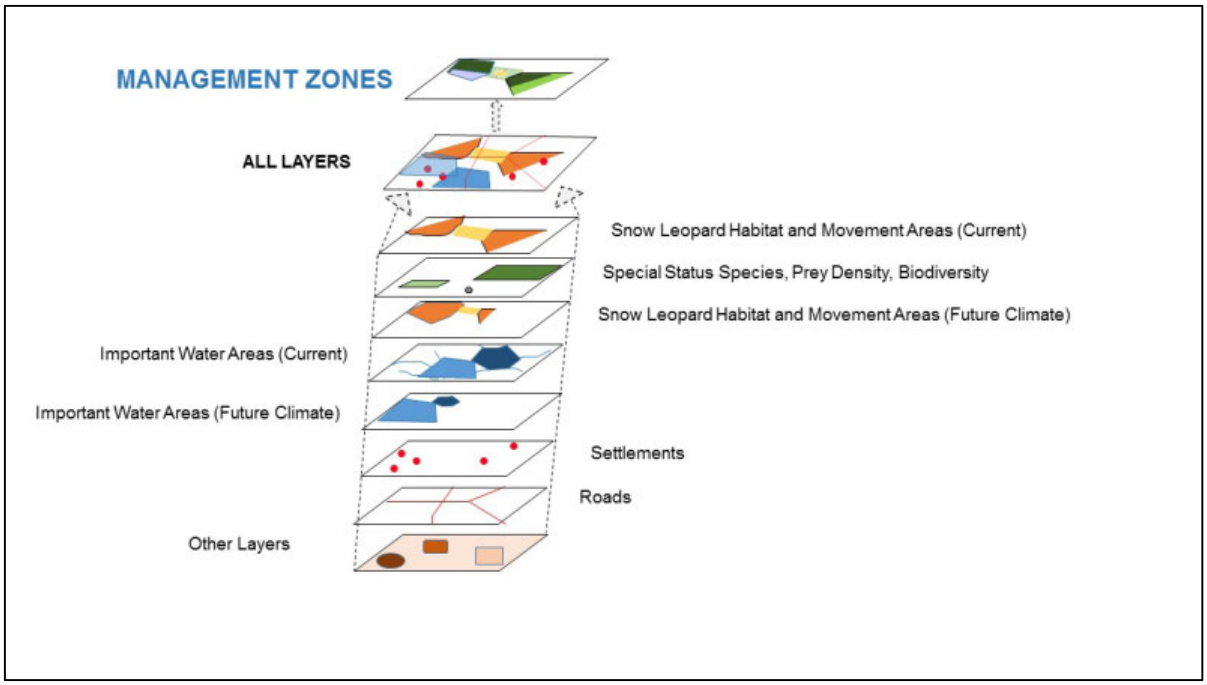

Figure 2. An assortment of ecological and physical data layers feed into a delineation of management zones.

4. Guidance and Resources for Producing GIS Layers

The following tools and methodologies can be used to create GIS layers to feed into the management planning process. Key layers include maps of snow leopard and other wildlife core habitats and movement zones, climate envelope models to predict changes in species habitats, other guidance for planning climate resilience into landscapes, and water provision services. We also provide guidance on ways to assign management zones based on multiple ecosystem values. These are just a subset of tools and approaches to get started – other tools and approaches may also exist. Innovating new approaches, and customizing model outputs, also may be appropriate.

4.1 Habitat Modeling

The following set of tools can be used to map species habitats. Approaches can also be modified to produce future projections of habitat under changing infrastructure or climate.

- **MaxEnt: Maximum Entropy Modeling Tool** [https://www.cs.princeton.edu/~schapire/maxent/] This software takes as input a set of layers or environmental variables (such as elevation, precipitation, etc.) as well as a set of georeferenced species occurrence locations, and produces a model of the niche of the given species. This tool can also be used to do future projections of habitat based on changing environmental inputs such as land cover, infrastructure or climate.
- **The Smart Infrastructure Planner**

[http://www.worldwildlife.org/publications/smart-infrastructure-planner-beta]
The Smart Infrastructure Planner is a GIS toolbox that uses a habitat suitability modeling approach (USFWS 1981) to enable GIS practitioners and stakeholders to evaluate the effects of future infrastructure development and landscape changes on wildlife. Inputs include things like landcover/land use, roads, mines and settlements. Climate change would presumably be incorporated by utilizing future models of landcover, land use and water as these are expected to be impacted by climate variables. The tool is built and tested for ArcGIS 10.0 and 9.3. The user manual provides an overview of process that can be implemented in other software types.

- **Resource Selection Technique**
  Uses observation data, GIS, and statistical analysis to define good and fair habitat based on snow leopard habitat use frequency by habitat type (Neu et al. 1974, Shrestha and Wegge 2008).

4.2 Corridor Design

The following tools can be used to model connectivity or potential for wildlife movement between core habitat patches.

- **GIS Tools for Designing Wildlife Corridors**
  [http://corridordesign.org/]
  Conceptual and technical resource on how to design wildlife corridors. There is also an ArcGIS toolbox called Corridor Designer that is available for download. The tool facilitates the process of building a cost raster, running cost distance, and applying a slice for the corridor (Beier et al. 2007, 2008).
- **CircuitScape, Linkage Mapper, and Gnarly Landscape Utilities** [http://www.circuitscape.org/]
  This site is home to Circuitscape, Linkage Mapper, and Gnarly Landscape Utilities, all of which are free and open source. Circuitscape borrows algorithms from electronic circuit theory to predict connectivity in heterogeneous landscapes (McRae 2008). Linkage Mapper uses least-cost corridor analysis, circuit theory, and barrier analysis to map corridors, detect pinch-points and restoration opportunities within them, and identify important core areas and corridors. Gnarly Landscape Utilities automates the creation of core area maps and resistance layers needed for connectivity modeling. This set also includes **Climate Linkage Mapper** to help map corridors following climatic gradients to facilitate species range shifts under climate change (Nuñez et al. 2013).

4.3 Coarse Filter Approaches to Conserve Biodiversity under Climate Change

There are two types of approaches that have been proposed for conserving species under climate change: coarse and fine filter. Climate envelope models are an example of a fine filter approach. These aim to project how niches for one or a few species might shift in response to a changing climate. Fine filter approaches are data intensive and often only suitable for a few well known species. The models, however, have been criticized as being subject to a high degree of error resulting from future emissions scenarios, future climate models, environmental inputs, and the niche modeling algorithms. Coarse filter approaches have been proposed as an alternative or complement to fine filter approaches. Coarse filter

approaches aim to conserve representation of geomorphological types or climate zone connectivity in hopes of preserving the number of species that occupy the cross-section of these zones.

- **Land Facet Mapping Tools**
  [http://corridordesign.org/downloads]
  Representing land facets (or major geomorphological types in the landscape) and ensuring their future connectivity in conservation plans has been argued as a means of preserving landscape biodiversity under a changing climate, as a complement to focal species mapping approaches. A land facet mapping tool for ArcGIS 10.x and other information is available on this site (Anderson and Ferree 2010, Beier and Brost 2010, Beier 2012, Beier and Brost 2012, Brost and Beier 2012).
- **Climate Corridor based on Climate Gradient Data**
  Climate corridors that connect 2 areas of different temperature through a unidirectional temperature gradient (Nunez 2012 approach). See **Climate Linkage Mapper** at http://www.circuitscape.org/

4.4 Mapping Water Provision Functions, An Ecosystem Service Value of Landscapes

The following summarizes an approach tested to map the water provision functions of several snow leopard landscapes. For each snow leopard landscape, four different primary functions were selected that represent different aspects of water provision. Four were selected since the relative importance of each of these functions for water provision differs by landscape. These functions were mapped out at the broader sub-basin context in order to assess the role that the snow leopard landscape plays in providing water as an ecosystem service.

- **Local runoff** is the amount of water in the landscape that ends up in a river or stream and then flows downstream. Source areas of runoff are often called "water towers"; these are often located on the mountain slopes in the upstream reaches of river systems. Local runoff can be modelled by looking at *rainfall* and then subtracting the component that is "consumed" by vegetation and soils (*actual evapotranspiration*) (See Figure 2). Local runoff must be considered in monthly timing over the course of a year, and in spatial patterns throughout the landscape. In regional contexts, water provision arguments should not only show positive associations with larger quantities of water, since floods are severe and abundant.

  Data sources: Current Mean Monthly Precipitation Historical Averages at 30s resolution (Hijmans et al. 2005); Current Mean Monthly Actual Evapotranspiration, based on historic Global Soil-Water-Balance, CGIAR, 30s resolution (Trabucco and Zomer 2010).

- **Snowmelt**. Downstream of mountainous regions, the seasonality of water provision is under direct influence of the annual *snowmelt* cycles. In many locations, the snowmelt cycle has a different timing from that of rainfall (or local runoff), often providing essential amounts of water just before, or at the end of the dry season. Global climate change may cause increased temperatures and changing amount, timing and distribution of snow and snowmelt. Such changes may lengthen the downstream dry season and/or exacerbate floods. For example, precipitation that historically would have been stored in the landscape over the winter might now run off and coincide with the flood season.

Data sources: Monthly data on snowmelt from 2006-2015 at 0.25 degree resolution (NOAH-GLDAS V.2.0 2015)

- **Aridity** concerns the extent to which water is the limiting factor in vegetation growth. Often-in a single landscape and over the seasons- local water balances can range on a gradient from humid to arid; where a chronic level of aridity indicates a trend toward desertification. In terms of water provision, it helps to see where in the landscape or its larger sub-basin there is enough water to sustain vegetation or provide water downstream, and where there is a demand for extra water. Aridity is calculated as the amount of *precipitation* divided by the amount of potential evapotranspiration. Potential evapotranspiration is calculated as the amount of evaporation that soils and vegetation would consume if water were not a limiting factor.

  Data sources: Current Mean Monthly Precipitation Historical Averages at 30s resolution (Hijmans et al. 2005); Current Mean Monthly Actual Evapotranspiration, based on historic Global Soil-Water-Balance, CGIAR, 30s resolution (Trabucco and Zomer 2010).

- **River system layout** can determine to what extent a location has the capacity to provide water to its downstream. In addition, it displays the capacity of downstream areas to receive water from upstream.

  Data source: HydroSHEDS 15s drainage directions (Lehner et al. 2008)

Additional water provision functions listed below are recognized for their importance to water provision, and can be mapped out. Currently, there is a high degree of scientific uncertainty about the way these processes work, and insufficient data to properly assess them systematically across the snow leopard range as water provision functions.

- **Presence of glaciers.** Similar to snowmelt, *glaciers* provide essential water provision outside of the seasonal precipitation. *Regelation* is an important process that lies at the basis of this: it refers to the water that melts from a glacier under the pressure of the thick overlying ice layers, regardless of surface temperature. Modelling quantities of glacial melt has been a challenge; each single glacier acts as a reservoir where water melts, or snowfall accumulates, according to many local factors that underlie the existence of each glacier. In general, glaciers cannot be considered to be renewable water resources without taking into account the rate at which they accumulate new snowfall, or considering the overall temperature-melt balance through which they have existed for centuries. Under a changing climate, these balances shift, though there is no real rule of thumb to determine whether a specific glacier is growing or shrinking.

  Data sources: GLIMS glacier database (GLIMS and NSIDC 2012)

- **Permafrost presence**. The *presence of permafrost* (Figure 2) has a direct influence on local hydrology. Seasonal shifts in the depth of permafrost are at the base of local hydrology, for example, in determining the seasonal water levels in wetlands. Often, the permafrost layer is impermeable, and soil-water interactions take place on top of the permafrost layer; the so-called *active layer*. Naturally, the thickness of the active layers is a very local soil characteristic, where issues of soil temperature, aspect, and vegetation cover are all of influence. Any change to these, as well as changes in air temperature will all trigger a chain of events, which often

leads to permafrost degradation. There is a high correlation between the presence of permafrost, and the larger snow leopard landscape. At the moment, however, there is limited research on how locally and region-wide permafrost degradation is likely to change under climate change, and how exactly it would affect snow leopard habitat.

Data source: Global permafrost database, Permafrost Zonation Index (PZI) (Gruber 2012)

- **Snow cover and frost line**. The seasonal *presence of snow* (figure 2) and the coinciding frost line (temperatures below zero 0°C) are important landscape characteristics that guide the seasonality of most landscape processes, including hydrology. Under changing temperatures, it is important how much the frost line would shift, when and where. Seasonality will change when the frost line changes, though this change might not always happen linearly; a shorter winter will result in earlier spring snowmelt, or also possibly in an extended flood season at the start of winter.

  Data sources: Current Mean Monthly Temperatures, based on historic WorldClim, 30s resolution (Hijmans et al. 2005); MODIS/TERRA Monthly Snowcover L3 at 5km (0.05 degree) resolution (Hall et al. 2006)

- **Lakes, wetlands, floodplains** are freshwater entities that form a relevant part of the river system layout and the overall water provision context. As with glaciers, the typical hydrology of each these freshwater entities are often too complex to be modelled in detail, yet for each landscape, they should nevertheless be described and characterized.

  Data sources: GIEMS D15 Database, Fluet-Chouinard et al. 2015.

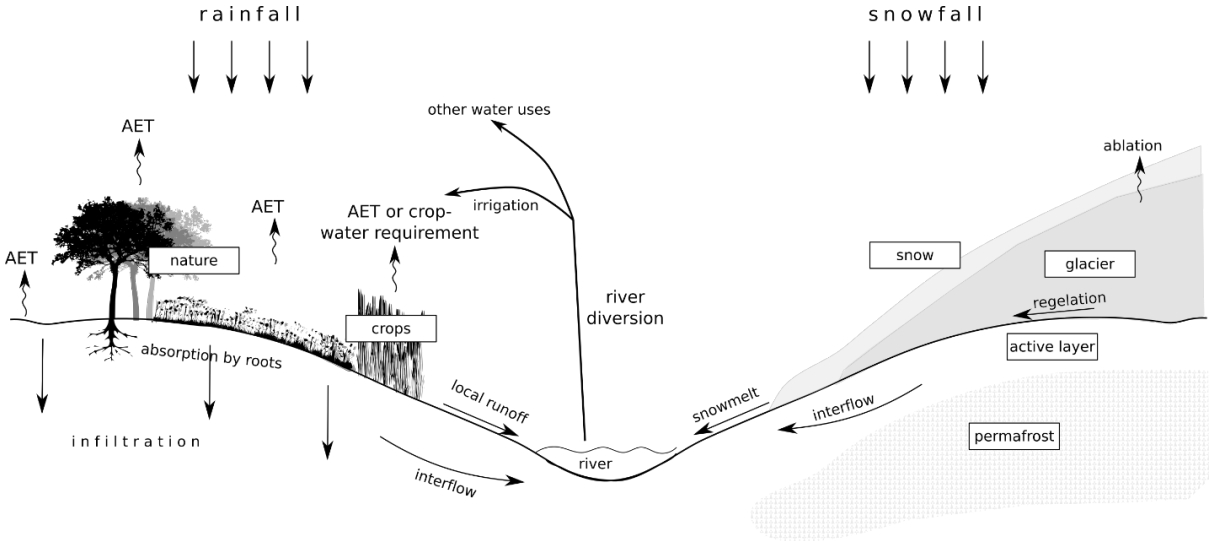

Figure 2. A simplified water balance including the components of rainfall, actual evapotranspiration, and local runoff. To the right: a simplified water balance of the cryosphere, including the components of snowfall, snowmelt, glaciers and permafrost.

4.5 Management Zones

Once all layers are available, it is necessary to consolidate the information to produce a single management zone map. There are often challenges to how to summarize overlaying information. The following are a few approaches that have been used in the past.

- **Ecological sensitivity mapping:** All spatial data layers are assigned an ecological sensitivity ranking and overlain in GIS. A given plot of land is assigned to the most sensitive ecological class of the species/features located in that place. Management guidance is then assigned accordingly (see Appendix 3 and Forrest 2011).
- **NatureServe Vista:** A GIS tool designed for land use planning [http://www.natureserve.org/conservation-tools/natureserve-vista]

5. References, Reading, and Additional Resources

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Appendices

Appendix 1: Secure 20 Landscapes by 2020

"The goal of GSLEP is for the 12 range countries, with support from interested organizations, to work together to identify and secure 20 snow leopard landscapes across the big cat's range by 2020, or, in shorthand—"Secure 20 by 2020". Secure snow leopard landscapes are defined as those that:

a) contain at least 100 breeding age snow leopards conserved with the involvement of local communities,
b) support adequate and secure prey populations,
c) have functional connectivity to other snow leopard landscapes, some of which cross international boundaries.

"Secure 20 by 2020" will lay the foundation to reach the ultimate goal: ensuring that snow leopards remain the living icon of mountains of Asia for generations to come." *(Snow Leopard Working Secretariat 2013, p. 15)*

Range countries agreed to the following 7 criteria for secure snow landscapes:

1. Snow leopard landscapes designated as 'ecologically fragile' zones that have defined 'values' and biodiversity-sensitive land-use and development planning for various zones within the landscape. Critical wildlife areas and corridors designated within the landscapes where damaging land use is minimized.
2. Stable or increasing population of snow leopards and sufficient prey populations maintained in the landscapes.
3. Sustainable and socially responsible development achieved through community based efforts and business models to enhance livelihoods of local communities within the ecologically fragile zones (landscapes).
4. Industry encouraged to aid local communities in the multiple-use zones within the snow leopard landscapes (chipping in funds for conservation and livelihood activities).
5. Local community involvement in conservation planning and implementation through community-based conservation efforts, provisioning of economic and other incentives, and policy and legal support.
6. Policy initiatives and strengthening of laws to effectively address traditional and emerging threats including climate change.
7. Sustainability of Global and National snow leopard programs through capacity building, technology, research, resource mobilization, multi-country information exchange and cooperation among the range countries.
8. Monitoring efforts involve two groups of activities: impact and process oriented activities. *(GSLEP, Issyk Kul, Kyrgyz Republic, June 2014, pp. 9-10)*

Appendix 2: Sample Work Plan for Producing Relevant Maps to the GSLEP Landscape Management Planning Process

Preparation

1. Evaluate existing maps or data on essential features for management planning in snow leopard landscapes: snow leopard habitat and movement areas, water resources, and climate vulnerability for water and snow leopards.
2. Identify other map/spatial data needs for landscape planning (ie, wildlife density, human infrastructure, future human infrastructure)
3. Define extents: snow leopard landscape for GSLEP (ie, the management landscape), snow leopard habitat analysis (present and under climate change), water analysis (present and under climate change)
4. Define data needs and availability
5. Acquire best-available data to support the mapping
6. Pre-process data and form an organized database

Snow Leopard Habitat and Movement

1. Evaluate existing maps and data on core snow leopard habitat and movement zones [as above]
2. Snow leopard core habitat: If a need to model new or improve existing:
    - Determine approach (Maxent, habitat suitability modeling, manual other)
    - Identify key criteria for determining snow leopard distribution
    - Prepare data for entry into model [as above]
    - Run analysis
    - Interpretation and thresholding
    - Assess accuracy
    - Convert to GIS data
    - Write up methods and describe any assumptions and limitations
3. Movement areas: Determine best source of existing data. Or, to produce new:
    - Identify key criteria
    - Determine mapping approach (Threshold of maxent model, least cost corridor, circuitscape, manual delineation)
    - Prepare data for entry into model [as above]
    - Run analysis
    - Interpretation and thresholding
    - Assess accuracy
    - Convert to GIS data
    - Write up methods and describe any assumptions and limitations
4. Bottlenecks: Determine definition and relevance in this landscape
    - Identify key criteria
    - Determine mapping approach
    - Prepare data
    - Analysis
    - Interpretation and thresholding
    - Assess accuracy

- Convert to GIS data

Climate Smart Landscape Planning for Snow Leopards

1. Refer to research to understand conceptually likely climate changes in this landscape and potential responses by vegetation, prey and snow leopards
2. Identify what information, data, or approach will be most useful to assure 'climate smart' conservation planning for snow leopards and/or biodiversity in snow leopard landscapes (ie, climate smart conservation principles? Niche models of snow leopards or their habitats, land facets? A combination?)
3. Identify what data exists and priorities for new analysis
4. For fine filter (niche modeling) approach:
   - EX. Use existing or produce new model on snow leopard/treeline shift using new downscaled data from Columbia & Worldclim
5. For coarse filter (land facet or geophysical representation):
   - Prepare input layers for land facet map. DEM derived topographic position index, soil map, etc.
   - Produce 'land facet' layer using land facet tool (http://corridordesign.org/downloads) or an isocluster algorithm.
   - Assess accuracy with expert opinion and ground data.
   - Run successive iterations
   - Interpret how to incorporate into land use planning (how much of each 'land facet' should be 'protected' and what 'protection' means, how to ensure connectivity of land facets). It may be necessary to run successive analyses, such as with Marxan which plans representation.
6. For climate smart approach
   - Determine criteria to include in core areas and multiple use zones, and approach
   - Prepare data
   - Use GIS based methods to implement approach

Climate Vulnerability of Important Water Areas

1. Using Columbia methodologies on broader sub-basin context n order to project climate futures and uncertainties.
2. Apply Columbia projections on selected water provision functions, identify critical thresholds and spatial shifts.
3. Combine historic, future waterscapes, relate to changes in landscape and changes to water use locations.

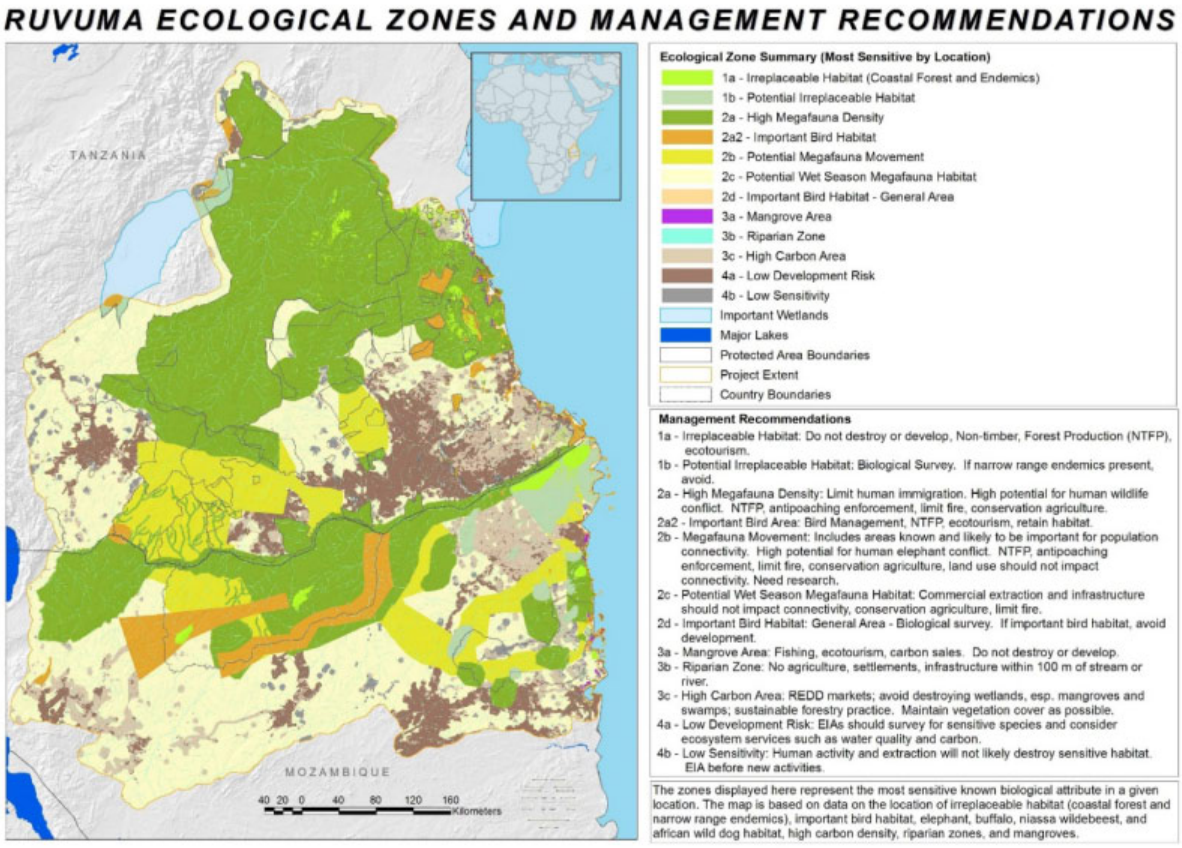
Mapping Management Zones

1. Engage stakeholders in creating definitions of ecological and management zones nested within the vision of the Bishkek Declaration, "20 by 2020", and 7 Criteria of Secure Snow Leopard Landscapes (Snow Leopard Secretariat 2013, GSLEP 2014).
2. Use data layers and GIS based approaches to delineate management zones
3. Review by experts and other stakeholders

4. Revise
5. Relevant stakeholders should approve
6. Seek government approval

Appendix 3: Sample Management Zonation

This map shows an example of a management zonation based on multiple conservation values. First, mapped conservation values were overlayed. Next, ecological zones with similar characteristics and values were delineated. Zones were assigned the ecological sensitivity score of the most sensitive ecological value present in a given place. Subsequently, each zone was assigned management protocols based on the ecological values present and their level of sensitivity.



Green, Resilient Economic Development in Snow Leopard Landscape Management Planning

Interim Advice Document Addendum to the General Guidelines for Climate Smart Snow Leopard Landscape Management Planning

Lead Author: Ryan Bartlett, (ryan.bartlett@wwfus.org), WWF, 1250 24th St NW, Washington, DC 20037, USA
Contributing Editors: Nilanga Jayasinghe (nilanga.jayasinghe@wwfus.org), Chris Czarnecki (chris@snowleopard.org)

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1. Background

A recent report estimates global infrastructure spending to reach nearly $80 trillion by 2025, with one third of this expected to occur in developing countries[1]. While critical to alleviating poverty, increasing access to markets, and economic growth in general, if done without proper consideration of current and future impacts on surrounding landscapes, such development will have considerable impacts on ecosystems, their services, and biodiversity that is in many cases already facing the downside of economic development. These range from severed migration pathways and habitat destruction, to water quality degradation and impacts on water flows, to name just a few. In the larger context of this development pressure, the effects of climate change continue to worsen, creating increasingly frequent and intense extreme hazards like droughts, floods, extreme storms, and incremental impacts due to increased temperatures, from glacial melt to desertification. The confluence of these two large drivers present the greatest challenge to ecosystem and biodiversity conservation today.

It is thus critical for governments around the world to embrace holistic and integrated landscape management approaches that effectively balance trade-offs for infrastructure development, natural resource management and biodiversity conservation that build climate resilience for communities and ecosystems. Important advancements have been made in recent years to develop such a framework, especially in striving for more sustainable development pathways in emerging economies in the developing world, through new approaches to sustainable, or "green" infrastructure development, including principles for a "Green Economy" developed by the Green Economy Coalition—a consortium of civil society groups and the private sectors—and more specifically and concretely for wildlife conservation, "Smart Green Infrastructure in Tiger Conservation Landscapes," developed in Bhutan by government and civil society representatives in 2011. These approaches, however, have yet to truly incorporate considerations of climate change impacts and the need for climate resilience. As is evidenced through both field observations, consultations with local stakeholders, and substantial peer-reviewed research, this is an especially important consideration for the snow leopard range, which is already experiencing the effects of climate change, and in many cases more extensively and rapidly than many other regions around the world.

A key aspect of the approach being used by GSLEP is to acknowledge legitimate roles of all stakeholders, including communities, governments and businesses, in the GSLEP landscape and develop management plans that balance the needs of conservation and development. Using principles of 'green development (economy)', and in particular 'green infrastructure' is thus a key means of this approach.

[1] https://www.pwc.com/gx/en/capital-projects-infrastructure/publications/cpi-outlook/assets/cpi-outlook-to-2025.pdf

9 Principles for a Green Economy

1. **The Sustainable Principle**: a green, fair and inclusive economy is a means to deliver sustainability
2. **The Justice Principle:** a green, fair and inclusive economy supports equity
3. **The Dignity Principle:** A green, fair and inclusive economy creates genuine prosperity and wellbeing for all
4. **Healthy Planet Principle:** A green, fair and inclusive economy restores lost biodiversity, invests in natural systems and rehabilitates those that are degraded
5. **The Inclusion Principle:** A green, fair and inclusive economy is inclusive and participatory in decision-making
6. **The Good Governance and Accountability Principle:** A green, fair and inclusive economy is accountable
7. **The Resilience Principle:** A green, fair and inclusive economy contributes to economic, social and environmental resilience
8. **The Efficiency and Sufficiency Principle:** A green, fair and inclusive economy delivers sustainable consumption and production
9. **The Generations Principle:** A green, fair and inclusive economy invests for the present and the future

From www.greeneconomycoalition.org. See Appendix 2 for full descriptions of each principle.

Moving forward, a critical next step will be to develop guidelines that specifically address the challenges of greener, more sustainable and climate resilient development across the unique landscapes of the snow leopard range stretching across millions of square kilometres in Central and South Asia. While these guidelines are developed, the principles from these two key resources—the Green Economy Coalition and Bhutan guidelines for smart green infrastructure—can serve as useful guidelines in the development of snow leopard landscape management plans across the range. Of course, not all of them will be relevant, given the differences between tigers and snow leopards, but they should nevertheless provide a useful starting point for considering these issues.

Appendices

Appendix 1: The Thimphu recommendations on smart green infrastructure in tiger conservation landscapes

Thimphu, Bhutan
May 30-31, 2011

On May 30-31, 2011, in Thimphu, Bhutan, representatives from diverse ministries, civil society, and the private sector in Bhutan, national experts from other Tiger Range Countries (TRCs) and international experts met to discuss how to ensure tiger conservation amid accelerating development pressures in tiger conservation landscapes (TCLs). The outcome of 'Smart Green Infrastructure in Tiger Conservation Landscapes: A Practitioner's Workshop', which was jointly organized by the Royal Government of Bhutan and the Global Tiger Initiative, is a set of recommendations for planning and implementing Smart Green Infrastructure (SGI) tools with application to land-use planning, hydroelectric power, roads and ecotourism development that can potentially impact TCLs. These recommendations may have wide applicability in TRCs.

Recommendations on Land-Use Planning

Recommendations at the policy level (National and Provincial Level)

- **Develop TCL Master Plans** encompassing core habitats, buffer zones, corridors and the wider production landscape to ensure inviolability of core habitats and compatible land use in the remaining landscape under available national or sub-national land-use policies or relevant physical/spatial planning acts.
- **Adopt comprehensive national physical/spatial planning legislation** wherever enabling land-use planning legislation is absent to ensure hierarchical land-use planning covering economic, social, environment and natural resource conservation, as well as infrastructure and urban and rural development.
- **Include SGI principles in environmental compliance legislation** through the development of tools and guidelines.
- **Finance the incremental cost of SGI** through the design and adoption of innovative business models building on the notion of Corporate Environmental Responsibility and offset banking, including economic and ecosystem valuation methodologies to support SGI.

Recommendations at the TCL level (Landscape Level)

- **Adopt core principles of SGI**, i.e. that tiger range areas are inviolate and that infrastructure in the remainder of the landscape incorporates engineering solutions for biodiversity.
- **Prepare an annual State of the TCL Report** based on a transparent monitoring framework using the best available science to report on changes in tiger habitat. This Report will also build awareness of SGI principles and hold stakeholders accountable for their actions to implement these principles.
- **Share responsibility for ensuring SGI across public agencies, the private sector, and civil society.** Conserving tiger landscapes is not the sole responsibility of forest and wildlife

departments, but a shared responsibility. Human capital and technical capacity to design, implement and supervise SGI must be built within infrastructure, planning and financial institutions. All sectors must contribute the resources necessary for this.

- **Identify and map critical biological/ecological corridors** linking TCLs and linking tiger habitats within TCLs. Their management must be mainstreamed in both land-use planning and TCL master plans to ensure tiger mobility while allowing for sustainable livelihoods and smart green infrastructure.
- TRCs, including Bhutan, are undergoing an intensive pace of urbanization. Cities are expanding and mushrooming in an unregulated manner. It is critical to **regulate unplanned urban sprawl** through a strict compliance with land use planning and zoning and to contain the ecological footprint of cities, particularly those in the contiguities of TCLs and other sensitive and high-value ecosystems.

Recommendations on Hydropower Development

Recommendations

- **Develop an overall hydropower development strategy** that takes into account sensitive environmental areas, including core tiger breeding zones. Such a strategy should build on Strategic Environmental Assessment of the hydropower sector and make upfront choices of what, when and where projects should be developed.
- **Define, delineate and designate No-Go Areas for core tiger habitats** as soon as possible.
- **A framework for establishing baselines environmental status and regular monitoring processes** should be established and implemented.
- **Institutional arrangements should be established** involving national and sub-national entities, and between sectors for planning specific projects, managing social and environmental risks and promoting adaptive management during the implementation of the project.
- **Accelerate skill enhancement and human resource capacity building** in order to enable the development and implementation of SGI in the hydropower sector.
- **Promote the principle of the developer meeting the full environmental and social costs of the project**, including paying for the value of ecosystem services provided to the project and making contributions to environmental offsets as appropriate to the project and country.
- **Use independent panels** on dam safety/construction and social-environmental issues which are accountable to the government to ensure expert monitoring and establish common ground between developers and government.
- **Promote the use of voluntary, industry-adopted corporate toolkits** among developers for defining good practices and a framework for sustainability assessments.
- **Highlight the right of Least Developed Countries (LDCs) to compensation for foregone opportunity costs of non-development in No-Go Areas in favour of Global Public Good values.**

Recommendations on Roads

Objectives

To manage road construction, operation and maintenance to support viable populations of tigers in each landscape in which roads and their ancillary infrastructure intersect. By 2022, a demographically stable meta-population of tigers in Bhutan to co-exist compatibly with rural livelihoods.

Building the process

Capacity-building, institutional coordination and financial resources (from partnerships, public purse, etc.) to construct, operate and maintain roads in TCLs, and supervise implementation of Environmentally-Friendly Road Construction (EFRC).

Recommendations

- **Use and enhance existing in-park road guidelines**[2] throughout TCLs to apply minimum standards to all road construction, maintenance and operation in TCLs. (Lead responsibility: Department of Forests and Park Services)
- **Develop monitoring tools/indicators for supervising implementation of guidelines in EIA process.** This should include developing the unit cost of environmental specifications, including supervision and monitoring. These tools would apply to both contractors in their EMPs and agencies that supervise road operation and maintenance following the construction phase. (Lead responsibility: Department of Roads with Department of Quality and Standards).
- **Distil lessons learned** from pilot approaches in the on-going national highway project.
- **Develop bidding documents that capture the unit cost of environmental mitigation and monitoring** as part of the submitted bid (estimate/km). (Lead responsibility: Ministry of Finance).
- **Clearly map and instil mitigation measures with principles of avoidance and SGI to existing and proposed infrastructure** in TCLs to maintain tiger populations. This needs to link with Master Plans for TCLs and be integrated into the National Road Plan.

Photo 1. A bulldozer haphazardly digs a road out of a hillside in Nepal's Tsum Valley. Eventually this road will reach all the way to Tibet. Photo: Chris Czarnecki

[2] Guidelines already exist for roads in protected areas.

Recommendations on Sustainable Tourism

Objective

To promote sustainable tourism in TCLs, recognizing that controlled and managed tourism can help support and protect globally significant biodiversity, tigers and their habitat.

Priority Recommendations

- **Develop guidelines to regulate tourism in and around TCLs.**
- **Include a tourism and visitor management component** in all TCL Master Plans.
- **Acknowledge that conservation comes first**, and that sustainable tourism is a tool to help fund TCLs, not a panacea for protection.
- **Develop tourism as a complementary rather than an alternative livelihood** for rural communities in and around TCLs.
- **Maximize the use of smart green technologies in all tourism facilities** (e.g. buildings, water supply, waste management, renewable energy, etc.).
- **Recognize that commercial viability is vital** for the sustainability of private sector and other partners who manage tourism operations.
- **Enforce legal regulations and zoning** to control ad hoc private sector development in and around TCLs.

Building the Process

- **Capacity-building, institutional coordination and financial resources** for SGI to facilitate sustainable tourism in and around TCLs.
- **Build community and host capacity to engage in responsible tourism**, to reap livelihood benefits, and to manage financial flows in and around TCLs.
- **Forge partnerships among TCL tourism stakeholders** to ensure coordination and responsible stewardship.
- **Develop interpretation and guide standards** for each TCL to enrich visitor experience and create awareness of conservation issues.
- **Develop products and amenities to match the range of target market segments** (high-end to budget, including domestic) in and around TCLs.
- **Be careful not to raise tourism and conservation expectations** at a community and national level that cannot be met.
- **Develop indicators to monitor and evaluate visitor impacts in TCLs.**

Appendix 2: Nine Principles of a Green Economy, from the Green Economy Coalition

The following are the nine basic principles of a green economy, from the Green Economy Coalition, which consists of various civil society groups and the private sector. See www.greeneconomycoalition.org for more information.

Nine Principles of a Green Economy

A green, fair and inclusive economy provides a better quality of life for all within the ecological limits of the planet.

1. **The Sustainable Principle**. A green, fair and inclusive economy is a means to deliver sustainability.
   - It is one of the vehicles to deliver sustainable development – not a replacement for it.
   - It respects its dependency on a healthy environment and it strives to create wellbeing for all
   - It addresses all three dimensions (environmental, social and economic) and develops policy mixes that integrate and seek the best results across all of them
2. **The Justice Principle**. A green, fair and inclusive economy supports equity
   - It supports equity between and within countries and between generations
   - It respects human rights and cultural diversity
   - It promotes gender equality and recognises knowledge, skills, experience and contribution of each individual
   - It respects indigenous peoples rights to lands, territories and resources
3. **The Dignity Principle**. A green, fair and inclusive economy creates genuine prosperity and wellbeing for all
   - It alleviates poverty
   - It delivers a high level of human development in all countries
   - It provides food security and universal access to basic health, education, sanitation, water, energy and other essential services
   - It transforms traditional jobs by building capacity and skills, respects the rights of workers and actively develops new, decent green jobs and careers
   - It achieves a just transition.
   - It acknowledges the contribution of unpaid work
   - It promotes the self-empowerment and education of women
   - It support the right to development if delivered in a sustainable way
4. **Healthy Planet Principle**. A green, fair and inclusive economy restores lost biodiversity, invests in natural systems and rehabilitates those that are degraded
   - It recognizes its dependency on the productivity of ecosystems and biodiversity
   - It does not violate, disrupt, or overstep ecological boundaries and commits to co-operate within them, including reducing pollution, safeguarding ecosystems, biodiversity integrity, other natural resources including air, water, soil, and bio-geochemical cycles

- It ensures that environmental integrity is maintained before allocating resources among competing uses
- It ensures an efficient and wise use of natural resources, including water, natural gas, oil and mineral resources, without compromising future generations prospects
- It supports the respect of all forms of life
- It applies the precautionary principle
- It assesses the potential impact of new technologies and innovations before they are released
- It assesses the environmental impacts of economic policies and seeks to find the least disruptive, most positive benefit for the environment and people
- It promotes the restoration of balance between ecological and social relations

5. **The Inclusion Principle**. A green, fair and inclusive economy is inclusive and participatory in decision-making
    - It is based on transparency, sound science and the visible engagement of all relevant stakeholders
    - It supports good governance at all levels from local to global
    - It empowers citizens and promotes full and effective voluntary participation at all levels
    - It respects cultural values, is tolerant to religious views and lifestyle choices, and sensitive to ethical considerations
    - It builds societal awareness, developing education and skills
    - It is transparent, inclusive and participatory, giving equal opportunities to, and advocating further for the rights of, young and old, women and men, poor and low skilled workers, indigenous peoples, ethnic minorities and local communities
6. **The Good Governance and Accountability Principle**. A green, fair and inclusive economy is accountable
    - It provides a framework to structure markets and production in consultation with all stakeholders
    - It reports its sustainable progress on environmental, social and economic measures, in company, national and international accounts.
    - It achieves transparency
    - It promotes international cooperation and defines international liability
    - It promotes global policy coherence and fair international cooperation
    - It promotes common but differentiated responsibilities
    - It commits to international human rights standards and environmental agreements
7. **The Resilience Principle**. A green, fair and inclusive economy contributes to economic, social and environmental resilience
    - It supports the development of social and environmental protection systems, and preparedness against and adaptation for climate extreme events and disasters
    - It creates a universal social protection floor.
    - It promotes a variety of green economy models relevant to different cultural, social and environmental contexts
    - It considers indigenous local knowledge and promotes the sharing of diverse knowledge systems

- It builds on local skills and capacities and develops these further
- It supports sustainable, diverse economies and local livelihoods
- It promotes systems approaches, recognising the interdependence and integrated nature of these systems, underpinned by culture and ethical values

8. **The Efficiency and Sufficiency Principle**. A green, fair and inclusive economy delivers sustainable consumption and production
    - It seeks to ensure prices reflect true costs incorporating social and environmental externalities
    - It implements the polluter pays principle
    - It supports life-cycle management, and strives for zero emission, zero waste, resource efficiency and optimal water use
    - It prioritises renewable energy and renewable resources
    - It seeks absolute decoupling of production and consumption from negative social and environmental impact
    - It delivers sustainable lifestyles supporting a major cultural transformation
    - It promotes social, economic and environmental innovation
    - It gives fair rights to access intellectual property within a global legal framework

Photo 2. Eco-camp for children in Mongolia. Photo Credit: Nature Conservation Foundation / Snow Leopard Trust

9. **The Generations Principle.** A green, fair and inclusive economy invests for the present and the future
    - It delivers inter-generational and intra-generational fairness
    - It promotes conservation of resources and the quality of life over the long term
    - It influences and regulates the finance sector so that it invests in the green, fair and inclusive economy and achieves a stable global monetary system
    - It prioritises long-term, scientifically-sound decision making above the short-term
    - It promotes equitable education at all levels and sustainability education for children