A Model for Utilising Local, Indigenous and Traditional Knowledge and Practices to Address Global Climate and Water Instability and Related Risks

-The Sacred Groves and Green Corridors Method

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Abstract:

This document examines the values of integrating traditional, local and indigenous knowledge (TLIK) based practices into an adaptive method for addressing human induced climate change. It proposes a comprehensive method that has been formulated integrating TLIK along with scientific and modern conservation and restoration techniques. It is based on two key features—a whole- global ecosystem interconnectivity approach and an adaptive strategy that considers both ecological and sociological opportunities and constraints in specific regions. It outlines a model by, which it is possible to create interconnected biodiversity networks that can span across vast distances and include many social groups around the world. It offers a way for the global community to cooperate in a united collective effort to safeguard fresh water and address human induced climate change.

Introduction:

Spurred by increasing instability in the climate systems and global water cycle and the related increase of natural disasters, Active Remedy Ltd. has formulated an innovative method that can be applied and adapted to facilitate ecological restoration, preservation and adaptation efforts around world. This method is called The Sacred Groves and Green Corridors (SGGC) method.

The SGGC method has been formulated in conjunction with traditional indigenous mountain people over many years. It offers a diversity of approaches that understand, respect and are adaptable to local ecosystems, values, spiritual customs and taboos. It is a horticultural method of working directly with mountain communities that integrates modern and traditional knowledge conservation methods, along with long-term sustainability concepts. It does this through combining the conservation methods of sacred groves, green-corridors/ greenbelts, permaculture and companion planting.

The SGGC method is based on two distinctive key features— safeguarding the ecological mechanisms, which regulate global water and climate cycles along with combining traditional, local, indigenous knowledge and modern conservation practices that fit with the ecological and sociological opportunities and constraints of specific regions. It draws on lessons learned in particular case studies, assesses their strengths and weaknesses and offers compatible practices

that can be used in combination to enhance effectiveness and long-term sustainability.

The SGGC method offers an adaptation strategy which can be implemented regionally and globally to address the instability in both the climate systems and global water cycle, through the regeneration of mountain ecosystems. In this it accords with the 2015 Sustainable Development document signed by world governments:

"By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development" (UN, 2015)

Climatic conditions around the world along with the global water cycle are exhibiting massive instabilities and related environmental disasters are increasing globally. It is widely accepted that humanity as a global community need to work imminently and collectively on addressing and resolving this global crisis. In order to do this, it is necessary to look at these cycles as a whole, rather than simply focusing upon their separate components. It is important to work with a clear comprehension of how they function interdependently and to direct a major focus upon the key environmental factors that regulate both climate and water.

Since the global water cycle and climate systems are totally interrelated and interdependent, they are both regulated by the same natural mechanisms. These natural mechanisms are made up of a global network of interconnected ecosystems. With the vast depletion of so many of these essential ecosystems, the disastrous repercussions upon water quantity and quality and climate patterns are extensive and rapidly increasing. It therefore follows that focusing upon preserving and restoring those ecosystems, which are essential for regulating water and climate, is a priority issue.

Mountain ecosystems are particularly fragile and influential components in the global water and climate regulation systems. Unfortunately they are experiencing massive environmental degradation. Much of the mountain biodiversity, which naturally performs many water and climate related functions, has been massively reduced and this is leading to erosions and desertification problems and negatively effecting precipitation patterns. Mountain snows and glaciers are rapidly retreating on a global scale, which is having many knock-on effects upon climate and threatening all fresh water supplies.

"Given their important role in water supply and regulation, the protection, sustainable management and restoration of mountain ecosystems will be essential." (UNESCO, Climate Change Impacts on Mountainous Regions of the World, 2013)

It is now globally accepted and highly apparent that safeguarding mountain ecosystems is key to safeguarding water and climate stability. It is for this reason that the SGGC method has a particular emphasis upon restoring and conserving these ecosystems. The overall objective of the SGGC method is to offer an adaptation tool, which can address climate issues, through facilitating biodiversity to spread quickly throughout mountain regions of the world, in a manner that can produce long-term sustainable results and help to alleviate the problems brought about by an intensification of the global water cycle. Mountain people are amongst the world's indigenous communities feeling the severe effects of climate change, ahead of many other communities. However the rest of the world's communities are not far behind them. Because the frozen ice and snow in mountain regions provide an enormous percentage of the worlds fresh water supply and since all major rivers are sourced in them, effective adaptation programs put into place there, affect the whole world.

The fragile environmental and social conditions in theses regions dictates that a selection of very sound conservation methods need to be combined to fit the diverse requirements and limited time-scale in, which action can still be taken. With this in mind, there are many benefits that can be gained from integrating traditional, local and indigenous knowledge (TLIK) practices into a modern conservation model of this scale. TLIK practices relating to land management, conservation and adaptation to environmental change can provide many key elements that are often missing in modern conservation approaches.

Working directly in an equal manner with the local communities and utilising tried and tested, successful TLIK practices, in order to address present-day dilemmas is logical and way in which to proceed.. This is because these practices have been tried and tested over thousands of years. Faced with many extreme environmental conditions, human societies have formulated traditions that have enabled them not only to survive but also to prosper. Extensive studies have been made over generations and a wealth of knowledge has been preserved within these TLIK practices. Many of these practices are still relevant today and can be adapted in order to fit present day conditions and requirements. They are compatible with scientific knowledge, as they are in fact the foundations of science, maths, medicine, agriculture, horticulture, engineering, and astronomy, which form the basis of modern development. Even skills as varied as the mining

and manipulation of metallic ores to cooking and knitting are part of humanity's store of traditional knowledge.

It is therefore reasonable that TLIK practices include techniques that demonstrate great potential to meet the present challenges of ecosystem degeneration, water shortages and climate change, which are predicted to increase over the coming decades. They appear to be a critical part and essential element for successful climate change adaptation strategies. It is for this reason that the SGGC method has been formulated integrating some carefully chosen and particularly successful traditional knowledge practices. The most prominent of these is that of establishing community managed sacred groves. This is an ancient practice that has been applied by traditional land based cultures around the world and, which has proven successful in extensive forest and biodiversity conservation over thousands of years.

Local mountain community participation using traditional tried and tested methods are fundamental to the process of adaptation. It is they who will comprise the "adaptation community" that is required to sustain the long-term ecosystem restoration and protection process over many generations. They not only carry knowledge regarding ecosystem restoration within mountain regions, they also have the capacity unlike most others, of living within these areas. Throughout many generations they have evolved mentally, emotionally and physically with the extreme conditions of mountain landscapes.

As was agreed upon in Article 7 of the UNFCCC Paris Agreement 2015, adaptation action should follow a 'participatory and fully transparent approach, taking into consideration vulnerable communities and ecosystems', and should be based on both science and local traditional knowledge.

Background of Environmental Conditions:

A. A Broader View of Global Climate Systems and the Water Cycle:

To produce successful adaptation models for effectively dealing with human induced worldwide climatic changes, it is vital to understand the interdependence between climate and water and their vital link to ecosystems

"Water is at the heart of both the causes and the effects of climate change (NRC, 1998)" (USGCRP, 2001)

Therefore climate change and the water cycle need to be addressed together,

recognising that many conditions that impact upon one also impact upon the other and vice versa. For example – mass deforestation can set off a chain of results that destabilise elements in both the water and climate cycle.

"In Earth System science, climate is not the long term average of weather statistics, but involves the non linear interactions between the atmosphere, oceans, continental ice, and land surface processes, including vegetation, on all time scales." (R.A. Pielke Sr, et al.2003)

Human activities over the past 100 years have led to severe increases in the atmospheric concentration of green- house gases in the forms of methane, carbon dioxide, water vapour and nitrous oxide. Direct impacts of these emissions on the environment include the rapid retreat of glaciers, changes in the Gulf Stream, El Niño and Monsoon patterns along with increases in severe weather events and the rise of sea levels. This destabilisation can produce negative feedback effects upon other aspects of the cycles, which can range from cyclones and hurricanes to flooding and drought. Generally these alarming repercussions are looked at in isolation but it is only really by looking at the cycle as a whole and on a global scale that cohesive adaptive solutions can be applied.

"Problems of water supply and hydrological extremes tend to manifest themselves at the "local" or "regional" scale. The storm systems that produce damaging floods may be highly concentrated over individual river basins, and a severe drought may span only a few contiguous U.S. states. Nevertheless, addressing such problems scientifically requires a global view of the water cycle—it is the global water cycle that drives local and regional behavior. A region's drought, for example, may be instigated by remote sea surface temperature anomalies. Locally heavy rains may simply be a local manifestation of a complex, continental-scale atmospheric pattern. The local phenomena that affect local water supply and hydrological extremes—phenomena with the greatest impact on society and ecosystems—must be understood in the context of the global system. This scientific understanding can contribute to more effective land and water resource management and hazard mitigation strategies" (*USGCRP*, 2001)

Unlike finite resources such as coal, oil and gas the fresh water cycle is a regenerative one and has been recycling freshwater for millions of years. However this cycle is utterly dependent upon mixed mountain forests and plants and approximately 75% of these indigenous forests have been cut worldwide.

Because of the complex interconnectivity between climate, ecosystems and the global water cycle, we cannot look at human induced climate change in isolation from the various environmental elements, which regulate climate. There is a sound, scientific basis for the need to preserve essential life supporting ecosystems and a great urgency to apply all adaptive methods while we are still capable and have a chance to do so.

"Ensuring that ecosystems are protected and conserved is central to achieving water security – both for people and for nature. Ecosystems are vital to sustaining the quantity and quality of water available within a watershed, on which both nature and people rely. Maintaining the integrity of ecosystems is essential for supporting the diverse needs of humans, and for the sustainability of ecosystems, including protecting the water-provisioning services they provide." (UN Water, Analytical Brief, 2013)

B. Mountains- As Global Regulators of Climate and Water:

Mountain regions are one of the essential ecosystems in urgent need of restoration for the healthy functioning of the hydrological cycle. They play a key role in maintaining freshwater quantity and quality worldwide.

"As a major ecosystem representing the complex and interrelated ecology of our planet, mountain environments are essential to the survival of the global ecosystem. Mountains are highly vulnerable to human and natural ecological imbalance. Mountains are the areas most sensitive to all climatic changes in the atmosphere." (UNCED, 1992)

Climatologists and microbiologists have demonstrated, that the relationship between plants, forests, biodiversity and global atmospherics are not simply a one-way affair. It is well known that glaciers in mountain regions are an essential element in climate regulation worldwide. Yet it is less understood, how much the mixed forests of these regions affect the on-going replenishment of these snows and glaciers and therefore what a pivotal role they play in the global water cycle and hence in atmospheric and climatic regulation.

"Ecosystems and landscapes sustain water resources. Forests play a major role in the water cycle, ensuring quantity, quality and stability of water for human use." (FAO/HLPE, Water for Food Security and Nutrition, 2015)

Healthy mountain ecosystems are actually key elements within global climate regulation. With so much of the biodiversity within these regions having been removed worldwide and with mountain glaciers melting rapidly, they are no

longer able to effectively perform the important climate stabilizing and regulating functions that they once did. Any successful adaptation strategy needs to take this into account

"The degradation of mountain ecosystems – home to 600 million people and the source of water for more than half the world's population – threatens to seriously worsen global environmental problems including floods, landslides and famine," (UNU,1992)

Bearing in mind the vital importance of the global water cycle and its intricate relationship with climate, it is worth considering the restoration of the worlds mountain forests as a vital initial step in climate adaptation programs. A Sustainable Development document agreed upon in New York by world governments on the 25/9/2015 emphasises this. In Goal 6 for water, Target 6.6 states:

"By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes" (UN, A/70/L.1, Target 6.6, 2015)

C. The Essential Role of Mountain Communities:

It is important to recognize that the collaboration with mountain communities is essential for the effectiveness of any environmental mountain restoration endeavour of this magnitude. It is they who will comprise the "adaptation community" who are required to sustain the long-term process over many generations. They not only carry knowledge regarding ecosystem restoration within mountain regions, they also have the capacity, unlike most others, of living within these areas. Throughout many generations they have evolved mentally, emotionally and physically with the extreme conditions of mountain landscapes.

Participatory initiatives, which involve local communities, are likely to be long term sustainable because they are based upon local knowledge. Involving community members in both decision-making and management roles, makes them more likely to comply with them. Participatory initiatives are therefore more likely to be compatible with environmental restoration programs in mountain regions and yield the most successful long-term results.

"Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies and

cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions." (UNGA. A/RES/61/295, 2007)

High climate variability has been a characteristic of mountain ecosystems, even before present day severe climate changes occurred. Indigenous cultures from all around the world, especially those of the high Himalayas and the Andes have been living in these unpredictable environments for centuries. Due to this, they possess a variety of knowledge and capacities, which have helped them to adapt to ongoing uncertainty and risk. Their way of living incorporates ecological values and holistic worldviews in which people and nature are inter-dependent. The indigenous peoples of Tibet are one of the groups who have much to offer the world in this respect. Over thousands of years indigenous mountain communities have developed an understanding of farming practices, which work in harsh environments As in the past the long-term well being of humanity depends on creating a balance and harmony with nature.
A major concern amongst the indigenous mountain communities is how to sustain traditional knowledge and promote its transmission when the men and young people are migrating to cities in need of employment and finances with which to support their families. Through providing traditional knowledge based employment opportunities throughout these regions and involving the youth in all community activities, there is a chance that they will be able to return and stay.

"Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future generations." *(Report of the UN Conference on the Human Environment, 1972)*

Men and women play different roles in society and can bring different initiatives, capacities and knowledge to climate change adaptation strategies. The SGGC method offers equal opportunities for both women and men to participate and contribute their input into. Largely due to economic reasons a large percentage of the men from mountain communities have had to leave their homes seeking employment elsewhere. This means that the majority of people, living in mountain regions are women and children. Hence initially it would be largely women conducting the work of regenerating these regions.

This would be enormously empowering for the women and, as a globally coordinated program, would also fit with agreement made by world governments in the document 'Transforming our world: the 2030 Agenda for Sustainable Development', which states in Goal 5, Target 5.5:

"Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life"

Methodology:

A. The Objectives of SGGC Method:

The Active Remedy Ltd. Sacred Groves and Green Corridors (SGGC) method is intended to be simple yet highly adaptable for diverse terrains, climatic variations and cultural norms and requirements. It offers a way by which a wide spectrum of varied social and cultural groups can co-operate in inter-cultural, international, trans-boundary, ecological interconnectivity efforts to safeguard and rebalance the global water cycle and climate systems.

The SGGC method outlines the replication of successful activities that could be combined and utilized as a means of advancing climate adaptation. It is intended to expand the adaptive capacity of socio-economic activities and to deal with current and future climate risks and variability's within mountain regions worldwide. It is intended to help mountain communities make informed decisions on practical adaptation actions and measures to respond to climate change on a sound scientific, technical and socio-economic basis. It deals with ecosystem protection and restoration and could be highly effective in reducing the impacts of climate change on people e.g. by conserving and restoring mountain forests to protect people and local biodiversity within mountain regions and downstream from storms, excessive flooding, water scarcity and crop failure.

Water is a pivotal resource for all of life on Earth and the SGGC method is founded on the assumption that by implementing the prescribed tools and management practices, local and regional water quantity and quality will be significantly improved.

B. Environmental Conditions that Dictate Requirements of the Model:

The task of restoring biodiversity throughout mountain regions worldwide requires careful planning and management. This is because many of these regions have been seriously degraded and weather conditions in them are often extreme.
The mass deforestation in mountain regions is leading to dangerous soil erosion and altered surface properties of the local ecosystems. This is changing the efficiency of the ecosystems exchange of water vapour, heat and carbon dioxide with the atmosphere. It is also leading to wide variations in rainfall and snow patterns and related problems with the recharging of water tables and aquifers downstream.

Despite the fact that conditions in mountain regions are often harsh and unaccommodating, biodiversity urgently needs to be restored throughout these regions, so that mountain ecosystems can continue to regulate the global water cycle and climate. Therefore the SGGC method has been formulated combining different tools that address the varied environmental and social requirements and obstacles.

C. The major obstacles to be addressed:

•Limited time in which restoration is still feasible
•Extreme weather variations
•Soil and biomass erosion
•Water shortages
•Reduced wildlife
•Steep and often dangerous terrain
•Extensive terrain
•Fragile trans boundary zones
•Continued removal of mountain resources
•Increased poverty amongst mountain communities
•Varied cultural norms and requirements among the different social groups involved
•Often bad diplomacy and distrust between rural mountain communities and national and local governance bodies

D. Specific Requirements that the SGGC Method Addresses:

•It is adaptable to diverse and sometimes extreme terrains and climatic

variations.

•It can spread biodiversity relatively fast and effect large areas of land in a relatively short time frame.

•The specific environmental restoration tools are adaptable for covering the wide variations in mountain ecologies and not damaging to the fragile balance of local ecosystems and wildlife.

•It is compatibility with the cultures, traditions and requirements of a wide range of social groups.

•Local communities are involved, empowered and supported and their environments and livelihoods are enriched.

•In providing a method of environmental restoration it also provides resources for their basic present and future needs.

•It offers an adaptive strategy by which a wide spectrum of varied social and cultural groups can co-operate in inter-cultural, international, trans-boundary, ecological, interconnectivity efforts.

•It aids in restoring biodiversity in headwater regions and in channelling fresh water into the underground streams and aquifers, which can effect wells and springs hundreds of kilometres away.

•It can help to bridge the gap between national and international decision making; regarding ecosystem management and the indigenous rural communities that live and work on the land.

E. The Key Elements of the SGGC Method:

In consideration of the specific social and environmental considerations that need to be addressed, the major techniques and strategies that have been selected for the SGGC method are: Sacred groves, Peace parks, Green corridors, Greenbelts and Permaculture.

Sacred Groves: We have selected the TLIK practice of creating sacred groves because this tradition is recognised internationally and has proven to be a highly effective tool for conserving biodiversity over thousands of years. Utilising this practice is also beneficial because it can enable ecological restoration efforts to

be in harmony with the traditions and customs of mountain communities and many rural social groups.

Peace Parks: We have selected this modern practice of creating peace parks for many of the same reasons as for utilising the tradition of sacred groves yet recognising that in some situations the practice of establishing peace parks could be more harmonious with the needs and social norms of the communities that would be most closely involved. In some areas this practice may be recognised and encouraged where the practice of sacred groves is not. They may be more desirable in areas where a specific religious designation is not wanted. Also this practice has some particularly valuable points when it comes to enabling positive trans boundary relations and cooperative initiatives for the purpose of peaceful relations between social groups that may have historically had tension and conflict.

Green Corridors and Greenbelts: We have selected these two similar techniques because, as a result of their application, remarkable environmental restoration and conservation results have been achieved. These results have been over large stretches of land and in areas that had previously been resistant to environmental restoration activities. They have proven to be a fast and effective method of conserving, spreading and linking biodiversity over large areas of land while focusing on relatively small areas. They enable the free movement of plants and animals, preserve species and prevent the fragmentation of habitats and ecosystems. They can help to protect surrounding lands from the intense effects of climatic fluctuations, droughts, floods and pests etc. They are also areas of land in which the local communities can be supported to sustainably cultivate plants that are both environmentally restorative and, which can also provide other benefits for the needs of the communities. These may include: medicine, food, fodder, fuel, fibres etc.

Permaculture: We have selected the permaculture design because it provides the specific formulas and techniques for propagating and conserving local biodiversity, recognises the profound relationship between humanity and the environment and an understanding of the supportive dynamics of varied ecosystems. It is an integrated design philosophy that encompasses gardening, architecture, horticulture, ecology and community design. It contains many techniques for working in harsh climatic and soil conditions and for greatly improving these conditions within a relatively short period of time. It gives tools for working with the beneficial properties of plants and the variety of life forms within the local ecosystems and demonstrates how to support these to function more effectively.

F. The Tradition of Sacred Groves:

In comparison to many Western scientific conservation models, a model, which includes the TLIK practice of sacred groves may have a greater chances being adopted throughout mountain regions of the world because it would be more compatible with the traditions of mountain communities. Sacred groves enhance local environmental and cultural wealth and are also ideal for practical environmental educational activities. They are similar to temples but with the main emphasis being on the biodiversity in the grove and not on a building. For thousands of years throughout India and the world, people have respected the importance of nature and biodiversity and have protected particular areas as sacred living temples, sacred groves or as places of exquisite beauty where they found solace, peace and a place for the reviving of their spirits and health.

"An inextricable link between present society and past in terms of biodiversity, culture, religious and ethnic heritage exists in sacred groves. Sacred groves are distributed across the globe, and diverse cultures recognize them in different ways encoding various rules for their protection." (M.L. Khan et al., 2008)

The combination of the trees and the various medicinal plants found in sacred groves, impacts greatly upon the surrounding areas. They have been shown to improve soil stability, prevent topsoil erosion and provide irrigation for agriculture in dry, arid climates; as well as providing healing sanctuaries and medicines. Many groves contain water resources such as lakes, ponds and streams, and the vegetative mass that retains water and releases it during times of drought.

"Sacred forests have consistently been found to have higher species diversity than surrounding areas and, in some cases, even more than government-protected areas in similar regions. Sacred forests also contain a high diversity of medicinally important plants. In a study of five sacred groves in Kodagu (Karnataka,India), Boraiah et al. (2003) found that 60% of the regenerating species (136 of 241 species) were medicinally important." *(Alison A. Ormsby et al, 2010)*

G. The Tradition of Peace Parks:

Peace Parks were initially created as a method for easing tensions between bordering States. By establishing the recognition of mutual dependence upon

shared biosphere systems, peace parks are a way of achieving peaceful relations between countries through environmental conservation and restoration of mutually important ecosystems. They are designated places where people of different traditions, backgrounds and age groups can join together in the spirit of peace and cooperation in creating places biological diversity and natural beauty. They bring people closer to nature, give a sense of community and belonging and protect biodiversity.

"For over seventy years, peace parks have served as a model for trans-boundary conservation that is holistic and cooperative." (Hsiao. E, 'Peace Parks for Mountain Forests', 2010,)

Utilising the combined practices of sacred groves and peace parks could be significantly important for designing strategies for rehabilitating many, otherwise unmanageable, degraded landscapes. The fact that these two traditions are globally recognized gives them the potential to fit with many different cultures, landscapes and situations. One way to restore and preserve biodiversity is to give local communities the right to look after it.

"Peace, Development and Environmental Protection are Interdependent and Indivisible."(UNCED, Rio 1992, Principe 25)

H. The method of Green Corridors and the Green Belt Movement:

Green corridors and Green Belts have proven to be fast and effective ways of conserving, spreading and linking biodiversity over large areas of land while focusing on relatively small areas. They facilitate free movement of plants and animals, preserve species and prevent the fragmentation of habitats and ecosystems. Isolated and fragmented areas of forest are more vulnerable to climate change and less capable of supporting wildlife, stabilizing soils and generating water.

"Fragmentation of habitats and ecosystems is one of the most serious threats to biodiversity worldwide. Retaining or restoring connectivity is crucial to securing healthy, resilient and sustainable ecosystems." (Bush Heritage, 'Connectivity , Conservation and Ecological Restoration')

Kenya's Green Belt Movement has made a great contribution to conservation worldwide. It became Internationally famous in 2004 when its founder, Wangari Maathai, was awarded the Nobel Peace Prize. Since 1977, in Kenya and other

parts of Africa, the Green Belt movement has planted millions of trees in an effort to restore ecosystems, empower women and promote sustainable livelihoods. Increasingly, Wangari Maathai has drawn a close connection between all these objectives and the quest for a peaceful society. As a result, Wangari Maathai and the movement she inspired are now well known Internationally (Bron Taylor, 2013, 'Kenya's Green Belt Movement').

Wangari Maathai also recognised the importance of uniting environmental conservation with the preservation of people's traditions and culture.

"As I tried to encourage women and the African people in general to understand the need to conserve the environment, I discovered how crucial it is to return constantly to our cultural heritage." *(Wangari Maathai, 2004, Nobel Prize acceptance speech)*

The green corridor/ green belt concept is also presently being recognised and implemented as 'Connectivity Conservation'.

"Connectivity conservation is based around the concept of 'landscape corridors' that maintain or establish multi-directional and multi-scale connections over entire landscapes and can encompass up to thousands of square kilometres. Connectivity conservation extends the concepts of biodiversity and biological corridors to the landscape scale." (Dept. Environment, Climate Change and Water, NSW, Australia, 2010)

Within green corridors/ green belts methods there is a lot of flexibility for cultivating a wide variety of native plant species that not only facilitate environmental restoration but, which also provide resources for local communities. Thus these communities benefit from the plants, which both preserve water and soil vitality and also provide medicines, fodder, food and fibre. Including plants, which provide these, can support the needs of mountain communities whilst at the same time conserving and spreading biodiversity. When managed cohesively so that the biodiversity is preserved, whilst at the same time sustainably harvested, these corridors can enrich local resources, bring more immediate employment and support cottage industry.

"The maintenance and restoration of ecosystem integrity requires landscape-scale conservation. This can be achieved through systems of core protected areas that are functionally linked and buffered in ways that maintain ecosystem processes and allow species to survive and move, thus ensuring that populations are viable and that ecosystems and people are

able to adapt to land transformation and climate change. We call this proactive, holistic, and long-term approach connectivity conservation." *(The Papallacta Declaration 2006)*

I. The Permaculture Approach :

Bill Mollison developed permaculture after spending decades in the rainforests and deserts of Australia studying ecosystems. He observed that plants naturally group themselves in mutually beneficial communities and he used this idea to develop a different approach to agriculture and community design.
It is based on the interdependent way that nature functions with the different plant and wildlife species regulating and supporting one another. Ideas for companion planting comes from similar observances.

The word permaculture refers to permanent agriculture and is understood as agriculture that is based on a natural sustainability model and that can be sustained indefinitely. It also refers to permanent culture, which recognizes the profound relationship between humanity and the environment and an understanding of the supportive dynamics of varied ecosystems. It is an integrated design philosophy that encompasses gardening, architecture, horticulture, ecology and community design. The basic approach is to create sustainable systems that provide for their own needs and recycle their waste.

"Permaculture shows how to observe the dynamics of natural ecosystems. We can apply this knowledge in designing constructed ecosystems that serve the needs of human populations without degrading our natural environment. Permaculture sites integrate plants, animals, landscapes, structures and humans into symbiotic systems where the products of one element serve the needs of another. Once established, a permaculture system can be maintained using a minimum of materials, energy and labor." *(*Sandy Cruz and Jerome Osentowski, Permaculture Article)

Permaculture is essentially it is about working with the strengths of natural biodiversity in creating all the necessary conditions. There are certain plants, which are excellent pioneer plants. They can be grown in harsh conditions (e.g. poor soil, exposure to the extreme elements, water scarcity, pollution etc.) Some have incredibly strong porous roots. Used in symbiotic relationships they are capable of making the land more hospitable and temperate and providing the necessary conditions for the rest of the native biodiversity to thrive. Certain combinations of native pioneer plants can be particularly effective in supporting the needs of biodiversity growth and can spread quickly, thus creating a living

green bandage for restoring degraded land. Permaculture involves management techniques, which supports the relevant biodiversity to reclaim harsh environments, establish balance and positively effect water and climate. Therefore the SGGC method could also be considered to be a permaculture design for the regeneration and preservation of watersheds and indigenous mixed mountain forests globally.

Although the term 'permaculture' is relatively recent, it draws upon thousands of years of traditional knowledge and human observance of the most beneficial natural dynamics and combinations that provide long-term environmental sustainability. This knowledge can be applied for protecting and restoring ecosystems and serving the needs of humanity without degrading natural environments. It is a way for humanity to work and live in harmony with Nature that respects the rights of fellow humans along with the other species that one shares this vast Earth with.

Conclusion:

On the basis of what has been discussed in this paper we conclude that TLIK practices are invaluable in addressing Climate Change and safeguarding the global water cycle. However it important to note, when considering strategies for adaptation to climatic changes, that although humanity has survived on planet Earth through developing elaborated strategies and ways of dealing with environmental and climatic changes, we have never been able to survive without adequate quantities of fresh water. Humanity's climatic adaptation has been an evolutionary process, involving a symbiotic relationship with the other species that we share planet Earth with and this process has happened over many thousands of years. Whenever a severe lack of water has been the major threat, humanity has been forced to relocate or perish. Thus it is necessary to preserve and restore all water related ecosystems.

"***Maintaining the integrity of ecosystems before they become compromised is an essential component of achieving water security and reducing the potential for conflicts. The continuous pace of human development is threatening the capacity of ecosystems to adapt, raising concerns that ecosystems will reach a tipping point after which they are no longer able to provide sustaining functions and services, and will become unable to recover their integrity and functions."*** (U.N Water, Analytical Brief, 22/3/2013)

References:

Alison A. Ormsby et al. 2010. 'Sacred Forests of India'

Bush Heritage, 'Connectivity Conservation and Ecological Restoration'

FAO/HLPE. 2015. Water for Food Security and Nutrition

Hsiao. E. 2010. 'Peace Parks for Mountain Forests',

M.L. Khan et al. 2008. 'The Sacred Groves and Their Significance in Conserving Biodiversity

NSW Dept. Environment, Australia. 2010. 'Climate Change and Water', R.A. Pielke Sr, et al. 2003. Non Linearities in the Earth System

The Papallacta Declaration. 2006

UNCED. 1992 . Agenda 21: Chapter 13 "Managing Fragile Ecosystems, Sustainable Mountain Development

UNESCO. 2013. Climate Change Impacts on Mountainous Regions of the World, http://unesdoc.unesco.org/images/0022/002246/224605M.pdf

USGCRP. 2001 . 'A plan for a new science initiative on the global water cycle', chapter 1. http://www.hydro.washington.edu/pub/CE/HYDRO/WaterStudyGroup/CH1_0201.PDF

UN. 1972 .Conference on the Human Environment.

UN Water. 2013. Analytical Brief

UN. 2015. A/70/L.1, 'Transforming our World: the 2030 Agenda for Sustainable Development', Target 15.4

UN. 2015. 'Transforming our World: the 2030 Agenda for Sustainable Development', Target 6.6, A/70/L.1,

(UNESCO, Climate Change Impacts on Mountainous Regions of the World, 2013)
http://unesdoc.unesco.org/images/0022/002246/224605M.pdf

UNGA. 2007. A/RES/61/295,'United Nations Declaration on the Rights of Indigenous Peoples'

UNU. 1992. Contribution to the Agenda 21, Chapter 13: 'Managing Fragile Ecosystems: Sustainable Mountain Development'