

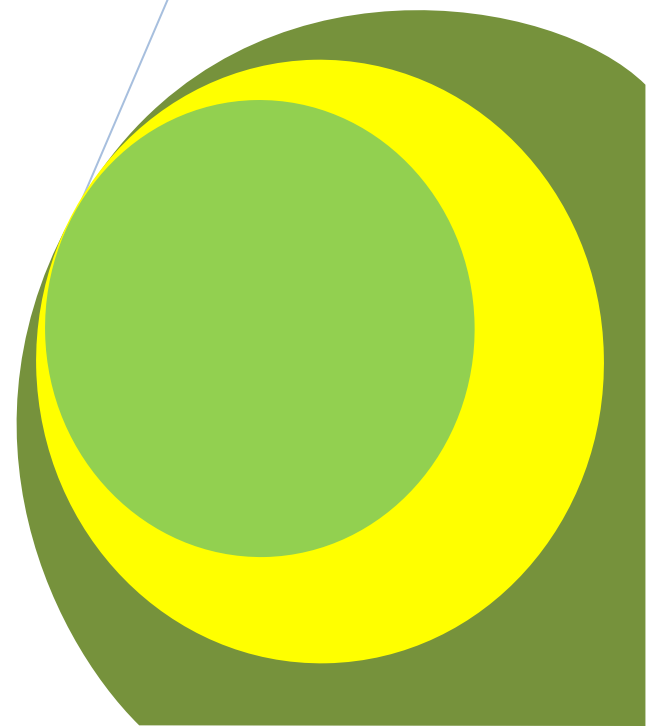
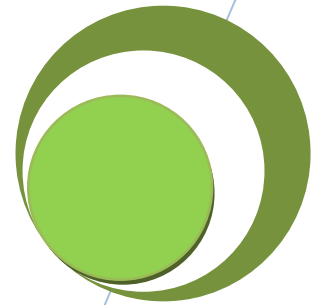


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Planning for Climate Change: Leading Practice Principles and Models

By

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Research Article

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ABSTRACT

Local communities exposed to climate change risks associated with warming, increased frequency or intensity of droughts, erosion, flooding, and changed rainfall and temperature patterns, threatening mountain biodiversity and ecosystems. These environmental risks represent a number of social and economic consequences for rural communities, exacerbated by existing socio-economic disadvantage and an aging population profile. The temporary housing and homes are at particular risk in the event of a major natural disaster. These housing forms are an important source of housing for low income without proper insurance or ownership of land there is a high likelihood that tenants will face long term displacement in the event of a disaster. Other social and amenity impacts for rural communities include damage to crop farm lands, and landscapes or items of cultural significance. Beach and cliff top trails and paths may be subject to more frequent damage and increased exposure to landslip. Changed rainfall patterns and increased likelihood of major drought events represent both long term and abrupt unpredictable risks to agriculture life. Over the next 20-30 years extreme weather events are likely to overwhelm existing infrastructure constructed to current design standards and these infrastructures will all experience increased pressures and require additional repair, maintenance and upgrading works. The following overarching principles for leading practice emerge from the literature on climate change mitigation and adaptation planning. The need to uphold the principles of ecologically sustainable development in designing adaptation and mitigation approaches, including environmental integrity, social equity and participation, economic viability and the precautionary principle. This is critical for mountain rural communities whose populations include higher proportions of lower income and socially disadvantaged groups.

The need to prioritize actions worth doing anyway, which for Aggrian communities mean actions that have multiple benefits for the environment, for managing coastal processes, for the affordable and efficient provision of infrastructure, for nature based amenity and tourism and for more socially cohesive settlements. The importance of a sound evidence base, for identifying and justifying planning responses to climate change. Local authorities need assistance in accessing, interpreting, and applying consistent and reliable sources of scientific information about climate change scenarios. They need to plan now, in order to prevent further risks associated with climate change. Mountain communities experiencing rapid growth or pressure for rapid development approval, before climate change considerations have been factored into planning and assessment frameworks. There is a particular need to review current planning controls to ensure that they enable new adaptive responses in planning for climate, as well as new technology for climate change mitigation. While climate change is increasingly recognized by Nepalese as a critical issue few local planning schemes include specific provisions for climate change, adaptation or mitigation, aside controls relating to them.

However, local authorities have planning provisions that may provide indirect protection from climate change impacts. For instance some responding to a national policy of climate change planning schemes. They include specific protection zones in their planning instrument or equivalent. Other mechanisms that may contribute to the adaptive capacity of local communities under future climate scenarios include bushfire protection or equivalent. This information suggests that many local bodies already have the basis for incorporating climate change considerations within their decision making and development assessment framework but that work needs to be revised in relation to specific climate change scenarios. Similarly, many local bodies have well established approaches to promote more sustainable forms, providing a sound basis for reducing harmful activities and for settlements that are more resilient to some of the impacts of climate change. There is an urgent need to build on and extend this work more widely.

Keywords: climate change, adaptation, conservation planning, community adaptation and policy frame.

INTRODUCTION

Local communities are facing many serious and widely documented challenges. Beyond the rural areas and along the deforested areas, rural communities have always been vulnerable to extreme weather events. However, high flow of highland to lowland movement of people has created rapid expansion within new and existing rural

settlements, due to growing populations and numbers of events, means that floods and drought in western tarai, or the flooding of the northern rivers in eastern tarai affect many more people and threaten the infrastructure and economic activities where they depend (MOF.2012). Such impacts are all the more significant given that existing infrastructure and services, particularly water, waste management, roads, and farming activities are already overstretched. Precarious local economies relying on agriculture particularly exposed to direct and indirect damage from major natural disasters. River basin settlements often older than new expanding urban centers overall; and situated in dispersed, single road access point settlements are particularly vulnerable when disasters strike. If, and when, such existing hazards intensify due to climate change, the impacts for low land rural communities will be devastating. But climate change also brings new threats for these communities, particularly those communities that are oriented towards natural amenities and lifestyle. Impacts like decreased rainfall in some areas and increases in others, hotter temperatures and humidity, and more forest fires represent significant additional risks for rural communities affecting population health, safety and lifestyle; the natural environment, local and regional economies (Sharma&Dhakal, 2011). There is an urgent need to assess the existing capacity of these communities to adapt to such risks. Thus time has come to outline the implications of climate change for rural change communities and explains why new approaches to rural resource planning and governance are needed. Many local governments both in Nepal and internationally are already developing innovative planning approaches that indirectly improve resilience to climate change, through biodiversity protection, sustainable economic growth, community wellbeing, or non polluting and localized forms of infrastructure and housing (AGO, 2007). The present iniquity is to draw the attention how rural communities can better plan to mitigate their contributions to climate and adapt to the inevitable changes already underway.

National Climate Change Strategy

The National Climate Change Strategy (NCCS) has been prepared to assist local governments in Nepal address, the challenge of rapid growth and change. The NCCS includes over 75 local government authorities. A key objective of the NCCS is to develop innovative and best practiced strategic planning for coastal amenity areas, to preserve local character and sense of place, integrate coastal management and conservation objectives with economic development, build social capital, and ensure community ownership and participation in key growth decisions. The research presented in this report contributes to this objective. It follows a series of research papers completed by the University of Sydney, in partnership with Australian coastal communities represented by the NCCS.

Communities and Climate Change

Change is a term commonly used in community level to describe lifestyle driven population growth and change within countryside and peri urban areas. This population growth differs from other types of growth as newcomers are attracted primarily to lifestyle or amenity reasons, rather than to improve their economic circumstances through a new employment opportunity. While jobs arise to service the new populations in amenity or lifestyle regions, many newcomers have reached retirement or pre retirement while others commute or telecommute to the capital cities. This change in lowland area mirrors an international phenomenon known as amenity migration, where people move to be closer to natural amenity and lifestyle opportunities. Population movements associated with livelihood change and amenity migration affect rural communities across Nepal in different ways. Many of these differences can be explained by understanding the location, settlement, and population variations that characterize low land amenity communities. These communities have distinguished a broad typology of rural communities affected by amenity driven population change.

Policy and planning responses, including responses designed to address climate change, should be sensitive to these different community types. Rural amenity community refers to the spectrum of peri and non urban local government areas known for their natural amenity, tourism, or lifestyle appeal. Climate change threatens all rural communities but lowland areas are under particular pressure. These pressures arise both from the well documented physical exposure of low lying areas to extreme climate change impacts and the particular demographic characteristics and changes affecting rural populations, beyond the urban areas. Rural amenity and lifestyle attractions are crucial to the economic, social wellbeing and appeal of change communities, but these attributes are at particular risk of both long term climatic changes and sudden unpredictable weather events. Planning and adaptation responses need to focus on maintaining their amenity and lifestyle qualities. However, the rapid pace of growth in many regions means that there is a real risk that planning authorities will continue along a standard development path and defer considerations about climate change impacts until it is too late. Rapid population growth or change itself is associated with increased vulnerability to natural hazards as newcomers are not accustomed to disaster protocols and as more lives and property are exposed to risk. Rural communities are often poorly resourced due to the size of their rate base, remoteness, and difficulties in attracting trained staff. They often span a very large

and varied geographical area which might typically contain multiple micro climatic conditions and many distinct ecosystems, unlike local authorities in metropolitan regions, who service more contained areas.

Approach of Research

There has been considerable effort to understand the science of climate change its causes and its likely effects. Undoubtedly there is far more scientific research to be done in this area. Lowland rural communities in Nepal themselves urgently require access to consistent and reliable spatial data about the likely impacts of climate change at the local level. Of equal priority is research matching existing scientific information to decision making processes on the ground. To date there has been relatively little work on the range of interventions that local governments, along with other levels of government, need to take to help their communities respond to climate change. However, information is now emerging to guide policy makers and planning practitioners in ensuring that future growth decisions consider potential change in climatic conditions. Much of this knowledge base is drawn from practice in the field, as local authorities throughout the world begin to assess their vulnerability to climate change and identify opportunities to strengthen their land use and infrastructure planning to reduce their ongoing contributions to greenhouse gas emissions (Burton, 2007). Research work has been undertaken by relatively well resourced local authorities within major cities, but there are still lessons to be learned for smaller local governments in regional areas. This effort synthesizes the existing information and practical examples and interprets it in relation to the particular contexts affecting Nepal's countryside and peri urban communities. It seeks to understand the current state of policy and planning in relation to climate change and Nepalese rural communities beyond the urban centers. It also aims at providing a policy guide and information resource for local councils in these areas to protect their communities and ways of life from the impacts of climate change through better settlement planning and development control. The work aimed at: scoping the potential environmental, social, and economic implications of climate change for rural communities, including a social vulnerability model to indicate communities which need the most assistance in adapting to these impacts; define leading practice in planning for climate change mitigation and adaptation, with a focus on farm communities in rural area of Nepal; establish the broader context of current policy and practice in planning for climate change mitigation and adaptation within Nepal local government areas, and particularly within rural areas; and, identify opportunities to extend and enhance this practice at local, regional and national levels. The research methods involved in reviewing of international and national literature on climate change, to identify impacts for rural communities; and to establish the best or leading practice principles and approaches in planning to reduce settlement contributions to greenhouse gas emissions, and to adapt to climatic changes already under way. An analysis of primary survey data to establish the extent to which Nepalese statutory planning instruments at local and regional levels currently, contain provisions relating to climate change preparedness or the minimization of greenhouse gas emissions. A targeted review of local planning practices relating to climate change mitigation or adaptation that focused on recent work undertaken by communities in rural areas, but does include a limited group of leading practice examples from other local government areas in Nepal. The review includes planning approaches directly or indirectly relevant to climate change across five themes: environment, community wellbeing, economy, infrastructure, and governance. The construction of an illustrative index of social vulnerability for rural communities to climate change, focusing on the local government areas covered by the NCCS at the time the research was carried out. The indicators for the index were defined with reference to known factors affecting community vulnerability to natural disaster within an area, and at community. The primary survey data noted from Land Use Planning Policy which currently contains detailed information about the planning frameworks of local authorities throughout the country. The data measures how local plans address a range of policy objectives, including resource protection, sustainable settlement and transportation, energy efficiency, water saving, biodiversity protection, and other construction works. It also tracks specific planning approaches for considering the impacts of a development on climate change contribution or risk. A special data run was undertaken to determine the extent to which local governments are addressing climate change mitigation and or adaptation through their statutory land use planning frameworks, either directly (with reference to climate change, resource degradation, greenhouse gas emissions and enhanced flood risk) or indirectly (through innovative measures relating to sustainable urban form, energy, water, waste management, or biodiversity protection. Further details about this source data and other population and economic trends characterizing communities affected by climate change is contained in the meeting the climate change challenge update data.

Leading Practice in Planning for Climate Change

Over the past decade much research has focused on the potential to build policy and practice by identifying and disseminating examples of leading or best practice in the fields of public policy, planning, natural resource management and tourism. The study undertaken here falls within this tradition and has referred to leading practice in

planning for climate change in terms of ideal approaches or principles as a basis for evaluating existing and potential program and planning responses. Study identified principles to guide in planning for climate change drawing on the national and international literature (Burton, 2007). Then pointed to examples to show how these principles might be implemented in practice. These examples often represent leading practice in sustainable planning, irrespective of climate change, but have been selected to demonstrate existing and potential strategies for addressing key issues that are likely to become more pressing for rural communities under future climate scenarios. Practice in planning for climate change mitigation and adaptation is at an early stage of development while it is premature to assess this emerging work as best practice or the term leading practice to refer to specific approaches that represent a positive attempt to respond to climate change. It focuses on approaches that seek either to reduce local contributions to global warming through better settlement planning, those that seek to improve the capacity of rural communities to adapt climate change impacts, or those that seek to do both.

Understanding Climate Change

Climate change refers to the processes of changes in the earth's atmosphere over time (IPCC 2007). Some climatic variations occur naturally. However, the rate of climatic change has increased significantly over the past two hundred years and particularly in the past century. These changes are largely triggered by shifts in the earth's atmospheric gases increasing concentrations of greenhouse gases, which have a warming effect on temperature, and aerosols, which have a cooling effect. They have resulted in an overall warming of the earth's climatic system, colloquially called global warming. Melting of the northern hemisphere snow caps, and increasing global average sea levels, are associated impacts of this global warming process. Increased concentrations of greenhouse gases such as carbon dioxide are attributed to the burning of fossil fuels. Changes in land use have exacerbated the problem as some types of land use like forest cover absorbs carbon dioxide. When forests are lost, these carbon sinks disappear too. Global warming itself reduces natural land and ocean absorption of carbon dioxide. This creates a carbon cycle feedback loop that means that even major reductions in current levels of greenhouse gas emissions, will not prevent a level of ongoing climatic change. Ultimately the IPCC concludes that even if greenhouse gas emissions stabilize soon, anthropogenic warming and sea level rise would continue for centuries due to the timescales associated with climate processes and feedbacks (IPCC 2007). However, if existing rates of fossil fuel use and land use change continue at present or greater levels, the IPCC warns that rates of climate change will likely increase too. This means that it is critical to reduce levels of greenhouse gas emissions as quickly as possible. It is also essential to prepare for and adapt to the climatic changes that are unable to be avoided. This is achieved through both mitigation actions, which reduce net carbon emissions and to limit climate change over time, and adaptation actions, which enable humans and natural systems to accommodate the impacts of climate change. Mitigation, then, helps reduce local carbon footprints, while adaptation helps to reduce the local impacts of unavoidable climate change. The built environment is a key contributor to greenhouse gases. The largest proportion of the total greenhouse gas emissions arise from fossil fuel combustion (around 49 per cent) and are mainly attributable to energy consumption, for manufacture of building materials plus the heating and cooling in buildings. In the United States, buildings account for 65 per cent of electricity consumption; 36 per cent of energy use; 30 per cent of greenhouse gas emissions, and 30 per cent of raw materials use (AGO, 2007). The patterns in which we build our communities are essential contributors to either increasing or abating emissions, particularly in relation to the need for motorized transport. In the United States, transportation now accounts for a full third of carbon dioxide emissions, and that share has risen from 31 percent in 1990 to 33 percent today. With business as usual, the share is unlikely to decrease in the future. Rather, the U.S. Department of Energy's Energy Information Administration (EIA) forecasts that driving will increase 59 percent between 2005 and 2030, while U.S. population only increases a projected 23 percent.

The international policy framework for climate change is established by the United Nations Framework Convention on Climate Change (UNFCCC). The Framework Convention was introduced at the Rio de Janeiro Summit in 1992 and came into operation in 1994. Within this framework, the Kyoto Protocol was established in 1997. Under the Kyoto Protocol, 36 signatory countries work towards targets for reducing their greenhouse gas emissions over time. The developed world committed itself to these legally binding emission limitation and reduction commitments at the international climate change meeting held in Bali in December 2007. The Intergovernmental Panel on Climate Change (IPCC) is an intergovernmental scientific body established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP). Its role is to provide neutral advice on the causes of climate change, likely socio economic and environmental impacts, and potential policy responses. The International Council for Local Environmental Initiatives (ICLEI) is an international association of local governments, national and regional local government representative organizations committed to environmental sustainable development. The Cities for Climate Protection Program is a key campaign of the ICLEI. This program guides local governments in preparing policies and measures to reduce local greenhouse gas emissions. This work has focused on the range of

mitigation efforts including education and awareness raising, using renewable energy, and sustainable waste management. They have recently undertaken a study of local adaptation responses as well.

Meeting the Climate Change Challenge in Communities

This study has highlighted two primary threats associated with climate change for rural areas in Nepal. The first is the physical exposure of many rural settlements to increased natural hazards, which threaten human safety, lifestyle, physical assets, and agriculture based economies. But the communities are not only physically vulnerable to climate change. The particular socio-economic profile of climate change communities means that many of these areas have higher levels of social vulnerability, reducing their capacity to adapt to climate change risk. The work presented here also outlined the critical need to mainstream climate change adaptation and mitigation considerations, in land use planning and development assessment, through frameworks able to respond to unexpected changes or new scientific information as it comes to hand. Local government, especially VDCs, is at the frontline of the spectrum of impacts associated with climate change, but they are not able to respond to those in isolation. In conclusion, the study proposed the following recommendations for agencies at local and community level to support and enhance practice in planning for climate change in rural communities.

- All planning authorities enact high level planning policy to mainstream climate change mitigation and adaptation considerations in all coastal planning decisions, to ensure long term livability and adaptability for rural communities.
- Response to climate change, local authorities undertake an initial vulnerability assessment incorporating: existing information and potential risks of climate change; the capacity of existing systems or processes to adapt to these impacts; and the potential to introduce new adaptation strategies.
- That a formal climate change vulnerability assessment be undertaken at regional or local scales, to support strategic land use planning decisions and significant development assessment in rural areas, including: the existing and potential exposure of particular locations / infrastructure, to risks associated with climate change and the potential to reduce this vulnerability through specific building standards, development controls, or direct works; the potential impact of the settlement or infrastructure, including the location and configuration of development, on the vulnerability of existing settlements, natural habitat or biodiversity, including downstream impacts; the location of existing and planned settlements / developments in relation to access routes, services, and infrastructure, and the likelihood of continued access to these facilities in the event of an emergency, the potential to reduce risks and the potential to further adapt the development / activity if climate impacts accelerate or increase.
- That carbon impact of future land use or development forms must become an explicit consideration in all strategic land use planning and development assessment processes in rural areas, including: the ability to service locations with alternative transportation, like public transport, walking, and biking, and the general contribution of the location to reductions in auto trip numbers and length, to assure that the location works toward climate change mitigation; the scale and duration of the impact, both of the primary development itself (and associated construction), and potentially, any downstream impacts. Ways to avoid, negate, or offset the impact of the development on greenhouse gas emissions and any existing or potential legal duty of care, to consider direct or indirect carbon impacts of the development.
- That in any adaptive response to climate change, consideration be given to the possible equity issues that may arise as a result of financial (eg. pricing policy) or regulatory (eg. building codes), and the differential impacts for particular members of coastal communities that may be particularly vulnerable to pricing or regulatory changes.
- That a mechanism be established to encourage and enable collaboration between neighboring local bodies in responding to climate change.
- Government needs to support local communities in building expertise and in undertaking the necessary vulnerability assessments and adaptation planning work, with dedicated funding and data resources.
- Further research on understanding and responding to social vulnerability to climate change impacts be undertaken, with priority assistance given to rural farm areas where physical exposure, socio-economic disadvantage, and population instability coincide.
- Intergovernmental agreement involving all three levels of government is developed to clearly state the commitments and responsibilities of national and local government in planning for climate change.

Leading practice in planning for climate change will not arise by accident. Nor is it desirable or realistic to expect most local government areas, particularly those servicing relatively small and remote populations, to develop appropriate responses without assistance from national government level. Rather, local governments need

considerable policy advice, technical support, and financial aid in developing, implementing and extending work already underway, to adapt to climate change impacts across country. Planning now for climate change will certainly improve medium and long term community resilience to potential climate change scenarios, but will also result in tangible economic, social, environmental and lifestyle benefits for rural communities today.

RECOMMENDATIONS

Following recommendations to enhance practice in planning for climate change across change communities in

1. All territorial planning authorities enact high level planning policy to mainstream' climate change mitigation and adaptation considerations in all sect, oral planning decisions, to ensure long term livability and adaptability for rural communities;
2. In response to climate change; local authorities undertake an initial vulnerability assessment incorporating:
 - existing information and potential risks of climate change;
 - capacity of existing systems or processes to adapt to these impacts; and,
 - the potential to introduce new adaptation strategies.
3. Formal climate change vulnerability assessment is undertaken at regional or local scales to support strategic land use planning decisions and significant development assessment in rural areas, including:
 - the existing and potential exposure of particular locations / infrastructure to risks associated with climate change and the potential to reduce this vulnerability through specific building standards, development controls, or direct works;
 - the potential impact of the settlement or infrastructure, including the location and configuration of development, on the vulnerability of existing settlements, natural habitat or biodiversity, including downstream' impacts;
 - The location of existing and planned settlements / developments in relation to access routes, services, and infrastructure, the likelihood of continued access to these facilities in the event of an emergency ;
 - The potential to reduce risks and the potential to further adapt the development / activity if climate impact accelerates or increases.
4. That carbon impact of future land use or development forms must become an explicit consideration in all strategic land use planning and development assessment processes, in rural areas including:
 - The ability to service locations with alternative transportation, like public transport, walking, and biking, and the general contribution of the location to reductions in auto trip numbers and length, to assure that the location works toward climate change mitigation;
 - The scale and duration of the impact, both of the primary development itself (and associated construction) and potentially any downstream impacts.
 - Ways to avoid, negate, or offset the impact of the development on greenhouse gas emissions and any existing or potential legal duty of care, to consider direct or indirect carbon impacts of the development.
5. That in any adaptive response to climate change, consideration be given to the possible _equity issues that may arise as a result of financial (eg. pricing policy) or regulatory (eg. building codes), and the differential impacts for particular members of communities that may be particularly vulnerable to pricing or regulatory changes.
6. That a mechanism be established to encourage and enable collaboration between neighboring local councils in responding to climate change.
7. That national government needs to support local authorities in building expertise and in undertaking the necessary vulnerability assessments and adaptation planning work with dedicated funding and data resources.
8. That further research on understanding and responding to social vulnerability to climate change impacts be undertaken, with priority assistance given to sensitive areas where physical exposure, socio-economic disadvantage, and population instability coincide.

9. That an inter-governmental agreement involving all levels of government be developed to clearly state the commitments and responsibilities of national and local governments in planning for climate change.

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