

An exploratory study on adapting to climate change in coastal areas of Sri Lanka

Shanila Athulathmudali, Amila Balasuriya, and Karin Fernando

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Executive Summary

Climate change is a global phenomenon that is predicted to disproportionately impact low and middle income nations and the strata of poor communities within these societies who are least able to withstand external shocks. These countries are now being propelled towards a paradigm shift that requires building environmental resilience without jeopardising economic development goals. There is a growing lobby for building adaptive capacity so that low and middle income countries will be better prepared to withstand the impacts of climate change that in turn have implications on economic growth and poverty reduction. Therefore countries including Sri Lanka have now started to look at ways in which these shifts can be incorporated into policy and practice.

Adaptive capacity encompasses the capabilities, resources and institutions of a country to effectively adapt or change its practices and achieve a sustainable balance. Establishing adaptive capacity cuts across economic, social, cultural, political and environmental sub sectors made up of a range of interactions involving a wide variety of “actors” from individuals, firms and civil society, to public bodies, governments and international agencies. These actors form a cascading system within which decisions and actions flow from policy to practice and vice versa. Different actors also tend to respond to the same stimuli/problem with different perspectives depending on their own capacities, agendas or spheres of influence. Therefore actors and their interactions play a central role in the ability to build adaptive capacity within a community, a project, a programme, a country. As described in the climate change adaptation literature, key elements that are seen as critical to adaptive capacity are; ecosystem resilience, knowledge chains, governance and socio-economic conditions. The several levels of actors and elements of adaptive capacity form the basis of the conceptual framework that examines the complex landscape of relationships and how their agendas and actions aid or hinder building adaptive capacity in the country. The interactions trace the vertical (upward and downward) and horizontal interactions from policy to practice among the different levels of actors. The frame identifies four levels of actors as 1) national policy level (dealing with national environment/climate change policy making), 2) sectoral policy making and implementation level, 3) civil society level and 4) ground/community/practice level.

The study sample was selected based on combining climate threats, economic sectors, poverty and vulnerability indicators. Based on this composite, poor communities in coastal areas reliant on fisheries, agriculture and tourism were ranked as highly vulnerable to climate change. Livelihoods such as small scale rain fed paddy farmers, small scale fishermen and local informal tourism service providers are seen as vulnerable groups.

The findings of the study are given in relation to the level of actors.

At policy level in Sri Lanka the study found that climate change is recognised as important. There is a national thrust for institutional greening through information exchange and interaction that occurs at a very high policy level, though these activities are not mandatory. The study found that a consultative process was being used for the policy making process as a way of influencing and filtering into sectoral policies to address climate change related

issues. However, the Ministry of Environment which is responsible for ensuring that climate change adaptation is undertaken does not have an implementation arm or the financial backing needed to support implementation which prevents the Ministry from moving beyond a regulatory or lobby group.

Sectorally, the study found that enablers for climate change adaptation were sector specific research, extension services and information flow structures which exist, especially within the agriculture and fisheries sectors. Ongoing research which has been taken to the grassroot level through existing extension and implementing arms within the administrative body have formalised structures that take information down to the farmers and fishermen. In contrast, research and extension does not exist in the tourism sector.

The obstacles to climate change adaptation at a sectoral level are the inherent sectoral priorities that exist (i.e. food security, productivity and income generation) over addressing climate change issues. The sectoral priorities undermine the urgency for tackling climate and environmental issues and it is not streamlined into sectoral decision making and action. Poor coordination between and within the ministries to share information and collaborate also reduces the push needed to apply the policy as well as implement at ground level. Furthermore the lack of a feedback mechanism to carry information from the ground up hinders the progress of climate change adaptation at sectoral level.

At civil society level, the study found that these actors had more flexibility in their mandate and thus were able to give higher priority to advocating sustainable practices. This is further aided by access to finances, technology and the ability to provide specific training and awareness to the affected communities. The innate ability for this type of actor to work on different scales moving up to policy and down to the ground, essentially acting as a feedback mechanism, is by far its greatest asset in enabling climate change adaptation. However, the civil society groups working on such issues are few and scattered and operate on a pilot level. These features limit the ability to generate a critical mass that would enable scale up or exert enough influence for the mainstream policy makers to accept or absorb climate change adaptation. Furthermore civil society groups are perceived in a negative light as they on occasion counter argue existing government policies. Perhaps the biggest barriers are the short term project cycles associated with the civil society and NGO sector that leads to projects not being sustained over the long term or absorbed into the mainstream.

At ground/practice level each sector was examined through case studies, the studies highlight the fact that current adaptive practices are done as a supplementary income source and do not completely replace other types of activities. An example of this can be seen in the agriculture sector where saline resistant crops are grown on degraded land and sold at premium prices in niche markets. While communities are engaged in this, they continue to grow paddy in the conventional way as their main income source. Climate change adaptation at this level has largely been driven by economic potential while being aided by the current environmental conditions that require changes in practice. External support has also been a critical factor providing awareness, technology, marketing links and funding. The post war context in Sri Lanka has also been a factor that has driven livelihood (i.e. from fisheries to tourism) changes. The limiting factors to adaptation at this level were the economic risk burden that individuals would have to face in adapting and the fact that the information available supports *status quo* mainstream sectoral agendas that do not see climate change adaptation or sustainability as a priority.

Overall, the livelihood changes adopted by communities or promoted by civil society groups tend to be short term coping mechanisms - prompted by economic gains rather than by a long term change in practice due to an environment stimuli.

Based on the study findings some conclusions have been drawn out towards improving adaptive capacity.

A common vision of what adaptive capacity means and what it aims to achieve, needs to be built and understood among various stakeholders and at various levels. It is also acknowledged that areas of focus differ for each level - the policy level focuses on buy in (governance), while sectorally, economic agendas, technology and capacity (knowledge chains) are at the forefront. At ground level, the issues are mainly concentrated on economic drivers. These needs have to be understood and reconciled among the different levels so that there are no mismatches or contradictions from policy to practice. Information flows about sustainable practices must be both upwards and downwards - so that policies can reflect and cater to ground realities.

Due to the specificity of adaption which is influenced by the sector, product and location, a more decentralised approach to adaptation needs to be considered. Furthermore adaptation at every level needs to be supported through funding, technology, capacity and experimentation to come up with specific problem solvers in order to have options for the future. Forums where information on the success and failures of these experiments can be shared, disseminated and exchanged are also necessary. Another important aspect that has to be taken into account is the time component that adaptation involves. It is a gradual process that has to work both down through the levels of policy makers, and across through the stakeholders to get individuals on board and build resilience to climate change impacts through trial, error and research according to the specific climate threats and context.

සාරාංශය

දේශගුණික විපර්යාසය ගෝලීය සංසිද්ධියකි. බාහිර කම්පනයටන්ට ඔරොත්තු දීමේ හැකියාව බෙහෙවින් ම අඩු වූ මධ්‍යම හා අඩු ආදායම් ලබන ජාතීන්ට හා මෙම සමාජයන්හි වෙසෙන දරිද්‍රතාවයෙන් පෙළන ප්‍රජාවන්ට මෙම සංසිද්ධිය විසමානුපාතික ලෙස බලපාන බවට අනාවැකි පළ කොට ඇත. ආර්ථික සංවර්ධන ඉලක්කයන් අවදානමකට පත් කිරීමකින් තොරව, පාරිසරික ඔරොත්තු දීමේ හැකියාව ගොඩ නැගීමට අවශ්‍ය කෙරෙන්නා වූ සංකල්පමය මාරුවීමට දැන් මෙම රටවල් යොමු කර තිබේ. අනුවර්තිත හැකියාව ගොඩ නැංවීම පිළිබඳ දැන් දැන් වඩාත් කතාබහට ලක් වන අතර මෙමගින් අඩු හා මධ්‍යම ආදායම් ලබන රටවල්වලට දේශගුණික විපර්යාවල බලපෑම් වලට වඩාත් හොඳින් මුහුණ දීමට සූදානම් විය හැකිය. තවද එසේ අනුවර්තිත හැකියාව ඉහළ නැංවීමෙන් ආර්ථික වර්ධනයට හා දරිද්‍රතාවය අඩු කිරීමට ද හේතු වනු ඇත. එබැවින් ශ්‍රී ලංකාව ඇතුළු රටවල් මෙම වෙනස්වීම්වලට මුහුණ දීම සඳහා කටයුතු කළ යුතු ආකාරය ප්‍රතිපත්ති හා ක්‍රියාකාරකම් කෙරෙහි ඇතුළත් කර ගන්නා ආකාර පිළිබඳ දැන් විමසිලිමත් ව ඇත.

ඵලදායී ලෙස අනුවර්ථනය වීම හෝ ඒවායේ භාවිතයන් / පැවතුම් වෙනස් කිරීමට සහ තිරසාර සමබරතාවයක් පවත්වා ගැනීමට වැදගත් වන රටක හැකියාවන්, සම්පත් හා ආයතන අනුවර්තිත හැකියාව යන්නට අන්තර්ගත වේ. අනුවර්තිත හැකියාවන් ගොඩ නැගීම ආර්ථික, සමාජීය, සංස්කෘතික, දේශපාලනික හා පාරිසරික උප අංශයන් යන සියල්ල හරහා සිදු වන අතර එය විවිධාකාර වූ ක්‍රියාකාරීන්ගෙන් එනම් පුද්ගලයින්, ආයතන, සමාජ සංවිධාන, මහජන ඒකක, රාජ්‍ය හා ජාත්‍යන්තර ආයතන ආදීන්ගේ අන්තර්ක්‍රියාකාරීත්වයන්ගෙන් සැදුම්ලද්දක් වේ. මෙම ක්‍රියාකාරීන් යම් පෙළ ගැසීමකට අනුව සැකසී ඇති අතර ප්‍රතිපත්ති මට්ටමේ සිට ඒවා ප්‍රායෝගිකව ක්‍රියාත්මක වන මට්ටම දක්වා ද ප්‍රායෝගික මට්ටමේ සිට ප්‍රතිපත්ති මට්ටම දක්වා ද ඔවුන් අතර තීරණ හා ක්‍රියාවන් ගලා යෑමක් සිදු වේ. එකම ගැටලුවකට විවිධ ක්‍රියාකාරීන් විවිධ දැක්මන්ට අනුව ප්‍රතිචාර දක්වන අතර ඒවා ඔවුන්ගේ ධාරිතාවන්, ඔවුන්ගේ න්‍යායපත්‍රයන් හා ඔවුන්ට බලපෑම් කළ හැකි පරාසයන් මත තීරණය වේ. එබැවින් යම් ප්‍රජාවක, ව්‍යාපෘතියක, වැඩසටහනක හෝ රටක අනුවර්තිත ධාරිතාවන්/හැකියාවන් ගොඩ නැගීමේ හැකියාව කෙරෙහි ක්‍රියාකාරීන් හා ඔවුන්ගේ අන්තර් ක්‍රියාවන් වඩාත් වැදගත් වේ. පොත්පත්වල සඳහන් වන පරිදි අනුවර්තිත ධාරිතාවන් කෙරෙහි වැදගත් වන ප්‍රධාන අංගයන් වන්නේ පරිසර පද්ධති ප්‍රත්‍යස්ථිතාව, දැනුම් දාමයන්, පාලනය සහ සමාජාර්ථික තත්ත්වයන්ය. මෙම අංගයන් හා ක්‍රියාකාරීන්ගේ මට්ටම අනුව සංකල්පමය රාමුවක් සඳහා වූ පදනම සකස් වේ. එම සංකල්පමය රාමුව මගින් සංකීර්ණ සම්බන්ධතාවන් හා ඔවුන්ගේ න්‍යායපත්‍රයන් හා ක්‍රියාවන් රටෙහි අනුවර්තිත ධාරිතාව ගොඩ නැගීමට අනුබල දෙන්නේද, එය අවහිර කෙරෙන්නේ ද යන්න විමසා බැලේ. ප්‍රතිපත්ති සිට ප්‍රායෝගික මට්ටම දක්වා විවිධ ක්‍රියාකාරීන් අතර පවතින තිරස් හා සිරස් අන්තර්ක්‍රියාවන් මීට ඇතුළත් වේ. මෙම රාමුව මගින් ක්‍රියාකාරීන් මට්ටම් 4ක් හඳුනාගැනේ: එනම් 1. ජාතික ප්‍රතිපත්ති මට්ටම (ජාතික පාරිසරික/දේශගුණික විපර්යාස ප්‍රතිපත්ති සම්පාදනය සමග කටයුතු කිරීම) 2. ආංශික ප්‍රතිපත්ති සම්පාදනය සහ ක්‍රියාත්මක කිරීමේ මට්ටම 3. සිවිල් සමාජ මට්ටම හා 4. බිම් මට්ටම/ප්‍රජා මට්ටම/ භාවිත කරන මට්ටම.

අධ්‍යයන නියැදිය තෝරා ගන්නා ලද්දේ දේශගුණික තර්ජන, ආර්ථික අංශ සහ දරිද්‍රතාවය හා අවදානම් තත්ත්ව දර්ශක මත පදනම් වෙමිනි. මෙම සංයෝගය මත පදනම් ව වෙරළාශ්‍රිත ප්‍රදේශයන් හි වෙසෙන, ධීවර, කෘෂිකාර්මික හා සංචාරක කර්මාන්ත මත යැපෙන දිළිඳු ප්‍රජාවන් දේශගුණික විපර්යාසවලින් වඩාත් අවදානමට ලක් වන පිරිස ලෙස ශ්‍රේණි ගත කෙරිණි. වැසි ජලයෙන් වගා කටයුතු කරන කුඩා පරිමාණ වී ගොවීන්, කුඩා පරිමාණ ධීවරයින් හා ප්‍රාදේශීය නොවිධිමත් සංචාරක සේවා සපයන්නන් වැනි ජීවනෝපායයන්හි නිරතවන්නන් අවදානමට ලක් වන පිරිස ලෙස හඳුනා ගැනිණි.

අධ්‍යයනයෙන් ලබාගත් තොරතුරු ක්‍රියාකරුවන්ගේ මට්ටම අනුව ඉදිරිපත් කර ඇත.

ශ්‍රී ලංකාවේ ප්‍රතිපත්ති මට්ටමේදී‍දේශගුණික විපර්යාස යන්න වැදගත් ලෙස සලකන බව අධ්‍යයනයෙන් අනාවරණය වේ. මෙම ක්‍රියාකාරකම් අනිවාර්ය නොවූවද, තොරතුරු හුවමාරුව හා අන්තර්ක්‍රියා ඔස්සේ ආයතනික හරිතකරණය සම්බන්ධයෙන් ජාතික පිබිදීමක් ඉතා ඉහළ ප්‍රතිපත්ති මට්ටමෙන් සිදු වේ. දේශගුණික විපර්යාසය හා ඒ ආශ්‍රිත ගැටලු ආමන්ත්‍රණය කිරීමට,ආංශික ප්‍රතිපත්ති කෙරෙහි බලපෑමක් ඇති කිරීමටත් ඒ තුළට කා වැදීමටත්,ප්‍රතිපත්ති සම්පාදන ක්‍රියාවලිය සඳහා උපදේශක ක්‍රියාවලියක් යොදාගත් බව අධ්‍යයනය මගින් හෙළි විය. කෙසේවුවද, දේශගුණික විපර්යාසය වෙනුවෙන් අනුවර්තනය වීම සහතික වීමේ වගකීම දරන පරිසර අමාත්‍යාංශය සතුව ක්‍රියාත්මක කිරීමේ අංශයක් නොමැති අතර ක්‍රියාත්මක කිරීමට අවශ්‍ය සහාය ලබා දීමට මූල්‍ය වත්කම් හෝ නොමැත. එබැවින් එය හුදෙක් පාලක හෝ අභිදේශන කණ්ඩායමක් පමණක් එනම් හඬක් නැගිය හැකි පිරිසක් බවට පත් ව ඇත.

අධ්‍යයනයට අනුව, ආංශික වශයෙන් දේශගුණික විපර්යාස කෙරෙහි අනුවර්තනය කිරීමට උර දෙන කරුණු ලෙස විශේෂයෙන්ම කෘෂිකාර්මික හා ධීවර අංශයේ පවතින ආංශික විශේෂිත පර්යේෂණ, ව්‍යාප්ති සේවා, තොරතුරු ප්‍රවාහ ව්‍යුහයන් දැක්විය හැකිය. දැනට පරිපාලන ඒකකය තුළ පවතින ව්‍යාප්ති හා ක්‍රියාත්මක කිරීමේ අංශයන් හරහා බිම් මට්ටමට ගෙන ගොස් ඇති දැනට සිදු කෙරෙමින් පවතින පර්යේෂණ සතු තොරතුරු ගොවීන් හා ධීවරයින් වෙත ගෙන යා හැකි විධිමත් ව්‍යුහයක් පවතී. මීට බෙහෙවින් වෙනස් වූ තත්ත්වයක් ලෙස, සංචාරක අංශයේ පර්යේෂණ හා ව්‍යාප්ති සේවා නොපවතී. ආංශික මට්ටමෙන් දේශගුණික විපර්යාස අනුවර්තනයන් සිදු කිරීමට ඇති බාධක වන්නේ දේශගුණික විපර්යාස ගැටලු ආමන්ත්‍රණය කරනවාට වඩා වැඩි අවේණික ආංශික ප්‍රමුඛතා පැවතීමයි (එනම් ආහාර සුරක්ෂිතභාවය, ඵලදායීතාවය, හා ආදායම් උත්පාදනය). ආංශික ප්‍රමුඛතා විසින් දේශගුණික හා පාරිසරික ගැටලු ආමන්ත්‍රණය කිරීමේ බලවත් ඕනෑකම යටපත් කරන අතර එය ආංශික තීරණ ගැනීමේදී ක්‍රියාකාරීව යොදාගෙන නොමැත. තොරතුරු හුමවාරව හා එක්ව කටයුතු කිරීමේදී අමාත්‍යාංශ තුළ හා ඒවා අතර පවතින දුර්වල සම්බන්ධීකරණය හේතුවෙන් ප්‍රතිපත්ති යොදා ගැනීම හා ඒවා බිම් මට්ටමේදී ක්‍රියාත්මක කිරීමට අවශ්‍ය උනන්දුව අඩු කරයි.තොරතුරු බිම් මට්ටමේ සිට ඉහළට ගෙන යාමට පවතින පසුපෙවුම් යන්ත්‍රණයන්හි හිඟකම හේතුවෙන් ද ආංශික මට්ටමෙන් දේශගුණික විපර්යාස අනුවර්තනයවීමේ ප්‍රගතිය කෙරෙහි බාධා එල්ල වේ.

සිවිල් සමාජ මට්ටම පිළිබඳ සැලකිලිමත් වීමේදී අධ්‍යයනයෙන් හෙළි වූයේ මෙම ක්‍රියාකාරීන් වඩාත් නම්‍යශීලී විධිවිධානයන් පවත්වාගෙන යන බැවින් ඔවුනට තිරසාර භාවිතයන් අභිදේශනය කිරීමට ඉහළ ප්‍රමුඛතාවයක් ලබා දිය හැකි බවයි. මූල්‍යාධාර වෙත ප්‍රවේශය, තාක්ෂණය හා බලපෑම්වලට ලක් වූ ප්‍රජාවන්ට අවශ්‍ය පුහුණුව හා දැනුම ලබා දීමට ඇති හැකියාව පැවතීම තවත් රුකුලක් වේ. මෙම ක්‍රියාකාරීන්හට ප්‍රතිපත්ති මට්ටමේ කටයුතු මෙන්ම බිම් මට්ටමේ කටයුතු ද සිදු කිරීමට හා ඊට ප්‍රවේශවීමට ඇති සහජ හැකියාව, පසුපෙවුම් යන්ත්‍රණයක් සේ යොදාගත හැකිවීම දේශගුණික විපර්යාසයන්ට අනුවර්තනය වීමට මහත් සේ උපකාරී වේ. කෙසේවුවද, මෙවැනි ගැටලු සම්බන්ධයෙන් කටයුතු කරන සිවිල් සමාජ කණ්ඩායම් පවතින්නේ අතලොස්සක් වන අතර ඒවා තැන තැන විසර පවතිනවා සේම කටයුතු පවත්වාගෙන යන්නේ නියමු මට්ටමිනි. මෙම කරුණු මගින් දේශගුණික විපර්යාසයන්ට අනුවර්තනය වීම අනුමත කිරීම හෝ ඒවා ප්‍රතිපත්ති තුළට ඇතුළත් කිරීමට ප්‍රතිපත්ති සම්පාදකයින්ට සැලකිය යුතු ප්‍රමාණයේ බලපෑමක් ඇති කළ හැකි වැදගත් ජන සමූහයක් බිහි කිරීමටඇති හැකියාව සීමිත කරයි. එපමණක් නොව, පවත්නා රජයේ ප්‍රතිපත්තීනට එරෙහිව නිතර කරුණු දැක්වීම හේතුවෙන් සිවිල් සමාජ කෙරෙහි ඍණාත්මක ආකල්පයක් ද ඇති කරවයි. ඇතැම් විට වඩාත් විශාලතම බාධකය වන්නේ සිවිල් සමාජයන් හා සම්බන්ධ කෙටි කාලීන ව්‍යාපෘති චක්‍රය සහ රාජ්‍ය නොවන සංවිධාන අංශය දිගු කාලීන වශයෙන් තිරසාර නොවීම හෝ ඒවා ප්‍රධාන ධාරවට ඇතුළත් නොවීමයි.

බිම් මට්ටමේදී සෑම අංශයක්ම සිද්ධි අධ්‍යයනයන් හරහා පරීක්ෂා කෙරුණු අතර අධ්‍යයනය මගින් හුවා දැක්වෙන්නේ වර්තමානයේ අනුවර්තන පැවතුම් සිදු කෙරෙන්නේ අනුපූරක ආදායම් උත්පාදන ක්‍රමයක් ලෙස බවත් එය මුළුමණින්ම අනෙකුත් ආකාරයේ ප්‍රධාන ආදායම් උත්පාදන ක්‍රියාකාරකම් වෙනුවට

යොදා ගැනීමක් සිදු නොවන බවත් ය. මීට නිදසුනක් ලෙස කෘෂිකර්ම ක්ෂේත්‍රයේදී දුර්වල තත්ත්වයට පත් වූ ඉඩම්වල ලවණතාවයට ඔරොත්තු දෙන, වෙළෙඳ පොළෙහි ඉහළ මිලක් ලැබෙන බෝග වගා කිරීම හැඳින්විය හැකිය. ප්‍රජාවෝ මෙහි නිරතවන අතරතුර සිය ප්‍රධාන ජීවනෝපාය ලෙස සුපුරුදු වී වගා ක්‍රමයේද නිරත වෙති. මෙම මට්ටමේදී දේශගුණික විපර්යාස කෙරෙහි අනුවර්තනය වීම ප්‍රධාන වශයෙන් ආර්ථික හැකියාව හේතු කොටගෙන සිදුවන්නක් වන අතර පැවතුම් හෙවත් භාවිතයන්හි වෙනසක් අවශ්‍ය කෙරෙන වත්මන් පාරිසරික තත්ත්වයන් ද මීට උපකාරී වේ. දැනුවත්භාවය, තාක්ෂණය, වෙළඳ පොළ හා මුල්‍යාධාර සපයමින් ලැබෙන බාහිර සහාය ද මෙහිදී වැදගත් සාධකයක් වේ. ජීවනෝපායයන්හි වෙනසකට තුඩු දුන් (ධීවර කර්මාන්තයේ සිට සංචාරක කර්මාන්තය වෙත) තවත් සාධකයක් වන්නේ ශ්‍රී ලංකාවේ පශ්චාත් යුද සංදර්භයයි. මෙම මට්ටමේදී අනුවර්තනය වීම සීමා කෙරෙන සාධක වන්නේ අනුවර්තනයේදී පුද්ගලයින්ට මුහුණ දීමට සිදුවන ආර්ථික අවදානම හා පවත්නා තොරතුරු මගින් සහාය දැක්වෙන්නේ දේශගුණික විපර්යාසයන්ට අනුවර්තනය වීම හෝ තිරසාරබව කෙරෙහි ප්‍රමුඛතාවය ලබා දී නොමැති ප්‍රධාන ප්‍රවාහයේ පවතින ආංශික වැඩසටහන්වලට වීමයි.

සමස්තයක් ලෙස ප්‍රජාවන් මගින් අනුගමනය කරන හෝ සිවිල් සමාජයන් විසින් අනුබල දෙන ජීවනෝපාය ක්‍රම වෙනස්කිරීම්, පාරිසරික හේතුවක් නිසා පැවතුම් වල දිගු කාලීන වෙනසක් ඇති කිරීමකට (අනුවර්තනයක් යනු එයයි) වඩා ආර්ථික වාසි මගින් උනන්දු කරනු ලැබූ කෙටි කාලීන මැඩ පැවැත්වීමේ යන්ත්‍රණයන් වෙත නැඹුරුතාවයක් පවතී.

අධ්‍යනයෙන් ලබා ගත් සොයා ගැනීම් මත පදනම්ව ඇතැම් නිගමනයන් අනුවර්තිත හැකියාව වැඩි දියුණු කිරීමට උකහා ගෙන ඇත.

විවිධ මට්ටමමේ සිටින්නා වූ විවිධ වූ පාර්ශවකරුවන් අතර අනුවර්තිත ධාරිතාව යනු කුමක්ද, ඉන් ළඟා කර ගැනීමට උත්සාහ දරන්නේ කුමක්ද යන්න පිළිබඳ අවබෝධයක් ගොඩ නැගීම අවශ්‍ය වේ. එමෙන්ම ඒ ඒ මට්ටම සඳහා අවධානය යොමු වන ක්ෂේත්‍ර වෙනස් වේ. ප්‍රතිපත්තිමය මට්ටමේදී අවධානය යොමුවන්නේ පිළිගැනීම හා එකඟතාවය සඳහා වන අතර ආංශික මට්ටමේදී ආර්ථික න්‍යාය පත්‍රයන්, තාක්ෂණය හා ධාරිතාව (දැනුම් දාමයන්) ඉදිරියෙන් සිටියි. බිම් මට්ටමේදී ගැටලු ප්‍රධාන වශයෙන් ආර්ථික ප්‍රවාහයන් මත පදනම් වේ. මෙම අවශ්‍යතාවයන් වටහා ගැනීමත් විවිධ මට්ටම් අතර එකඟත්වයක් හෝ එකමුතුවක් ඇති කිරීමත් කළ යුතු අතර එමගින් ප්‍රතිපත්ති මට්ටමේ සිට ප්‍රායෝගික මට්ටම දක්වා පරස්පර විරෝධීබාවයන් හෝ නොගැලපීම් ඇති නොවේ. තිරසාර භාවිතයන්/පැවතුම් පිළිබඳ දැනුම ප්‍රවාහයන්/ගැලීම් ඉහළටත් පහළටත් සිදු විය යුතුය. එවිට ප්‍රතිපත්ති මගින් බිම් මට්ටමේ යථාර්ථයන් වඩාත් හොඳින් නිරූපනය වන අතර ඒ සම්බන්ධයෙන් වඩාත් හොඳින් කටයුතු කිරීමට ද හැකි වේ.

අංශය, නිෂ්පාදිතය, හා ස්ථානය යන කරුණු මගින් අනුවර්තනය කෙරෙහි යම් බලපෑමක් ඇති වන බැවින් අනුවර්තනය වඩාත් නිශ්චිත නොහොත් විශේෂ එකක් වේ. මෙම නිශ්චිතබව හෝ විශේෂත්වය හේතුවෙන් වඩාත් විමධ්‍යගත ප්‍රවේශයක් පිළිබඳ සලකා බැලීම අවශ්‍ය කෙරේ.එපමණක් නොව සෑම මට්ටමක ම අනුවර්තනය සඳහා මුල්‍යාධාර, තාක්ෂණය, ධාරිතාව හා අනාගතය සඳහා විකල්ප අවස්ථා සලසා ගැනීම උදෙසා නිශ්චිත ගැටලු විසඳීම් ලබා ගැනීමට අත්හදාබැලීම් ආදියෙන් රැකුලක් සැපයිය යුතුය. මෙම අත්දැකීම්හි සාර්ථකත්වයන් හෝ අසාර්ථකත්වයන් පිළිබඳ තොරතුරු සාකච්ඡා කළ හැකි, හුවමාරු කළ හැකි සංසදයන් පැවතීම ද වැදගත් වේ. අවධානයට යොමු කළ යුතු තවත් වැදගත් කරුණක් වන්නේ අනුවර්තනය සඳහා ගතවන කාලයයි. මෙය නිශ්චිත දේශගුණික තර්ජනයන් හා සංදර්භයන්ට ට අනුව අත්හදාබැලීම්, වැරදීම් හා පර්යේෂණ ඔස්සේ දේශගුණික විපර්යාසවල බලපෑම් වලට ඔරොත්තුදීමේ හැකියාව ගොඩ නැගීමට ජනතාව එකඟ කර ගැනීමට නැතහොත් ජනතාව ද සම්බන්ධ කර ගැනීම ප්‍රතිපත්ති සම්පාදකයින්ගේ සිට පහළට ද පාර්ශවකරුවන් හරහා ද ක්‍රම ක්‍රමයෙන් සිදු විය යුතු ක්‍රියාවලියකි.

நிறைவேற்றுச் சுருக்கம்

காலநிலை மாற்றம் என்கின்ற உலகளாவிய நிகழ்வானது, வெளிப்புற தாக்கங்களை எதிர்த்து நிற்க முடியாத, குறைந்த மற்றும் நடுத்தர வருமானம் உள்ள நாடுகளையும், மற்றும் இச் சமூகங்களிலுள்ள வறுமையான சனசமூகங்களின் அடுக்குகள் மீதும், விகிதசமமற்று தாக்கம் விளைவிக்கக்கூடியது என முன்னறிவிக்கப்படுகிறது. இந்நாடுகளானவை தற்பொழுது பொருளாதார அபிவிருத்தி இலக்குகளை பாதிக்காதவகையில், சுற்றாடல் எதிர்ப்பை கட்டியெழுப்ப தேவைப்படும் ஒரு மாதிரி மாற்றத்தை நோக்கி முடுக்கி விடப்பட்டுள்ளது. ஆகவே பொருளாதார வளர்ச்சியிலும், வறுமைக் குறைப்பிலும் தாக்கத்தை ஏற்படுத்தக்கூடிய, காலநிலை மாற்றத்தின் தாக்கங்களை எதிர்த்து நிற்பதற்கு நல் தயார்நிலையைப் பெறுவதற்காக குறைந்த மற்றும் நடுத்தர வருமானத்தையுடைய நாடுகள் அதற்கான மாற்றத்தக்க இயலுமையைக் கட்டியெழுப்புவதற்காக ஆதரவு திரட்டுவது வளர்ந்து வருகிறது. ஆகவே இலங்கை உட்பட்ட நாடுகளானவை தற்பொழுது இவ்வகையான மாற்றங்களை, எவ்வாறு கொள்கை மற்றும் செயற்பாட்டில் உள்ளிணைக்கப்படலாம் என்ற வழிகளைத் தேடுவதற்கு ஆரம்பித்துள்ளது.

மாற்றத்தக்க இயலுமை என்பது இயலுமைகள், வளங்கள், வலுவான முறையில் மாற்றுவிப்பதற்கு அல்லது அதனுடைய பழக்கங்களை மாற்றுவதற்கும் ஒரு நீடித்து நிலைக்கக்கூடிய சமநிலையை சாதிப்பதற்குமான இயலுமையையும் உள்ளடக்கியிருக்கிறது. அந்நாட்டின் நிறுவனங்களையும் உள்ளடக்கியிருக்கிறது. மாற்றத்தக்க தகைமையை நிறுவிக்கொள்வது என்பது தனிநபர்கள், நிறுவனங்கள், சிவில் சமூகம் என்பவற்றிலிருந்து பொதுஅமைப்புக்கள், அரசாங்கங்கள், சர்வதேச முகவர்கள் வரைக்குமான பரந்துபட்ட செயற்பாட்டாளர்களுடன் சம்பந்தப்படும் இடைச் செயல்களின் வீச்சிலிருந்து செய்யப்பட்ட உபதுறைகளாகிய பொருளாதார, சமூக, கலாசார அரசியல் மற்றும் சுற்றாடல் உபதுறைளையும் ஊடுருவிச் செல்கிறது. இச்செயற்பாட்டாளர்கள் தீர்மானங்களும் செயற்பாடுகளும் கொள்கையிலிருந்து செயற்பாட்டுக்கும், மறுதலையாகவும் நகரும் ஒரு மேலிருந்து பாய்ச்சும் முறைமையை உருவாக்குகிறார்கள். ஒரேவிதமான தூண்டுதலுக்கு ∴ பிரச்சினைக்கு, வேறுபட்ட செயற்பாட்டாளர்கள் தமது சொந்த இயலுமைகள், நிகழ்ச்சிநிரல் அல்லது செல்வாக்கு செயல்நிலைகளைப் பொறுத்து, வேறுபட்ட நோக்கில் பதிற்செயற்பாடு காட்டத் தூண்டப்படுகிறார்கள். ஆகவே இச் செயற்பாட்டாளர்களும் அவர்களுடைய இடைச்செயல்கள் ஒரு சனசமூகத்திற்குள்ளேயோ ஒரு கருத்திட்டத்திலேயோ அல்லது ஒரு நிகழ்ச்சித்திட்டத்திலேயோ அல்லது ஒரு நாட்டிலோ மாற்றத்தகு தகைமையைக் கட்டியெழுப்புவதற்கான, இயலுமையை நோக்கிய ஒரு முக்கிய வகிபங்கை வகிக்கிறது. பாடத்திலே புகட்டப்பட்டவாறாக மாற்றத்தகு தகைமைக்கான முக்கியமானவைகளாகக் காணப்படும் முக்கிய சக்திகளாவன, சூழற்றொகுதி நெகிழ்ச்சியினை ஒருங்கிணைத்தல், அறிவுச்சங்கிலிகள், ஆட்சிக்கட்டமைப்பு மற்றும் பாய்வு, சமூக பொருளாதார நிலைமைகள் என்பன உள்ளன. செயற்பாட்டாளர்களின் மட்டங்களின் அம்சங்களும் இசைவிப்புத் தகைமை சக்திகளும் உறவுமுறைகளின் சிக்கல் தளங்களையும், நாட்டில் இசைவிப்புத் தகைமையை கட்டியெழுப்புவதில் அவர்களின் நிகழ்ச்சிநிரல்களும், செயற்பாடுகளும், எவ்வாறு உதவிகளையோ அல்லது தடைகளையோ போடுகின்றன என்பதை பரிசோதித்து கருத்துநிலை ரீதியான சட்டக வேலைக்கான அடிப்படையை உருவாக்குகிறது. இந்த இடைச்செயல்களானவை நிலைக்குத்தான மற்றும் கிடையான கொடுக்கல் வாங்கல்களை கொள்கை ரீதியான செயற்பாட்டுக்கு, பல்வகையான செயற்பாட்டாளர் மட்டங்களிடையே, இச்சட்டக அமைப்பானது 4 மட்ட செயற்பாட்டாளர்களை இனங்காண்கின்றது. அவையாவன. 1) தேசியக் கொள்கை மட்டம் (தேசிய சுற்றாடல் காலநிலை மாற்றம் கொள்கை உருவாக்கம் என்பவற்றுடன் ஈடுபடல்) 2) துறைசார் கொள்கை உருவாக்கம் மற்றும் நடைமுறைப்படுத்தல் மட்டம் 3) சிவில் சமூக மட்டம் 4) அடிமட்ட / சனசமூக / செயற்பாட்டு மட்டம்.

காலநிலை அச்சுறுத்தல்கள் பொருளாதாரத்துறைகள் மற்றும் வறுமை மற்றும் தாக்கப்படு தன்மை சுட்டிகள் என்பவற்றின் ஒன்றிணைப்பின் அடிப்படையில் கற்றல் மாதிரி தெரிவு செய்யப்பட்டுள்ளது. இந்த ஒன்றுசேர்ப்புகளை அடிப்படையாகக் கொண்டு மீன்பிடித்துறையில், விவசாயம் மற்றும் உல்லாசப்பயணத்துறையில் தங்கியுள்ள கரையோர பிரதேசங்களைச் சேர்ந்த வறிய சனசமூகங்கள் காலநிலை மாற்றத்தால் மிகவும் தாக்கப்படக்கூடியவைகளாக வரிசைப்படுத்தப்பட்டுள்ளன. குறைந்தளவில், மழையை நம்பிப் பயிர் செய்யும் நெல் விவசாயிகள், குறைந்த மட்டத்தில் தொழில் செய்யும் மீனவர்கள் மற்றும் உள்ளூர் முறைசாரா உல்லாசப்பயணத்துறை சேவை வழங்குநர்கள் (வாழ்வாதாரங்கள்) நலினக்குழுவினராகக் காணப்படுகின்றனர்.

செயற்பாட்டாளர்களின் நலினக் குழு மட்டத்துடன் தொடர்புபடுத்தி ஆய்வின் கண்டுபிடிப்புகள் தரப்படுகின்றன.

இலங்கையில் கொள்கை மட்டத்தில் காலநிலை மாற்றம் குறித்த ஆய்வானது முக்கியமானதாக அங்கீகரிக்கப்படுகிறது. தகவல் பரிமாற்றத்தின் ஊடாக நிறுவனங்களை பசுமைப்படுத்துவதற்கான ஒரு தேசியத் திணிப்பு காணப்படுவதுடன் இந்த செயற்பாடுகள் ஊடாக மிக உயர் கொள்கை மட்டத்தில் நடைபெறும் இடைச்செயல்கள் கட்டாயமானதாகக் காணப்படவில்லை. ஆலோசனைச் செயன்முறையானது காலநிலை மாற்றம் தொடர்பான பிரச்சினைகளைத் தீர்ப்பதற்கு துறைசார் கொள்கைகளில் செல்வாக்குச் செலுத்தி வடிகட்டும் ஒரு வழியாக கொள்கை வகுப்புச் செயன்முறையில் பயன்படுத்தப்படுகிறது. எவ்வாறாயினும் காலநிலை மாற்றத்திற்கு ஏற்ப மாற்றுவிப்பதை உறுதிப்படுத்துவதற்கு பொறுப்பெடுத்துக் கொண்டுள்ள சுற்றாடல் அமைச்சானது ஒரு அமுல்படுத்தல் பிரிவைக் கொண்டிராமலும் அல்லது அமுல்படுத்தலை ஆதரவளிப்பதற்குத் தேவையான நிதி ஆதாரத்தை கொண்டிராமலும், ஒரு வெறுமனே பிரச்சார குழுவாகவே அது உள்ளது.

துறை ரீதியாக காலநிலை மாற்றத்திற்கான மாற்றத்தை இயலச் செய்வோராக ஆய்வு எதனைக் கண்டு கொண்டுள்ளது எனில், துறை ரீதியான விசேட ஆய்வு, சேவைகளில் விஸ்தரிப்பு, தகவல் ஆய்வுக் கட்டமைப்புக்கள் என்பன விவசாய மற்றும் மீன்பிடித்துறையில் விசேடமாக அமைந்திருக்க வேண்டும் என்பதாகும். தற்போதுள்ள விஸ்தரிப்பு மற்றும் நடைமுறைப்படுத்தல் அலகுகள் ஊடாக நிர்வாக அமைப்புக்குள் நடைபெற்றுக்கொண்டிருக்கும் ஆய்வுகளை அடிமட்ட மக்களுக்கு எடுத்துச் செல்லுவதானது விவசாயிகளுக்கும், மீனவர்களுக்கும் தகவல்களைக் கொண்டு செல்வதற்காக மறுசீரமைக்கப்பட்ட கட்டமைப்புகளைக் கொண்டிருக்கிறது. உல்லாசப்பயணத்துறையானது ஆய்வுகளையோ அல்லது விஸ்தரிப்புகளையோ கொண்டிருக்கவில்லை.

துறை மட்டத்தில் காலநிலை மாற்ற மாற்றத்துக்கான தடைகளாக உள்ளவை, அங்கே காணப்படும் வழிவந்த துறை ரீதியான முன்னுரிமைகளாகும். அவையாவன (உணவுப் பாதுகாப்பு, உற்பத்திறனும் வருமான ஈட்டுகையும்,) என்பன மிகக் கவனம் செலுத்தப்படும் காலநிலை மாற்றப் பிரச்சினைகளாகும். துறை ரீதியான முன்னுரிமைகள் காலநிலை மற்றும் சுற்றாடல் பிரச்சினைகளைக் கையாளுவதற்கான அவசரத் தன்மையைக் குறைத்து விடுவதுடன், இது துறைரீதியான தீர்மானம் எடுத்தல் மற்றும் செயற்பாடுகளை ஒழுங்குபடுத்துவதாகவும் இல்லை. தகவல்களைப் பகிரவும், ஒத்துழைத்துச் செயற்படவும், அமைச்சுகளுக்கு உள்ளேயும், அமைச்சுகளுக்கு இடையேயும் காணப்படும் குறைந்தளவான ஒருங்கிணைப்பானது கொள்கைகளைப் பிரயோகிப்பதற்கான உந்துதலைக் குறைப்பதுடன் அடிமட்டத்திலான அமுல்படுத்துகையின் தேவையையும் குறைக்கிறது. மேலும் அடிமட்டத்திலிருந்து தகவல்களை கொண்டு செல்வதற்கான பின்மதிப்பீட்டுப் பொறிமுறை இல்லாதிருப்பதானது துறை மட்டத்தில் காலநிலை மாற்ற இசைவிப்பின் முன்னேற்றத்தில் தடையேற்படுத்துகிறது.

செயற்பாட்டாளர்கள் தங்கள் ஆணையில் அதிகம் நெகிழ்ச்சி தன்மையுடையதாக இருப்பதாகவும், இதன்படி அவர்கள் நீடித்து நிலைக்கக்கூடிய செயற்பாடுகளுக்கு பரிந்துபேசுவதற்கு உயர் முன்னுரை கொடுக்கக்கூடியதாக இருப்பதாகவும், சிவில் சமூக மட்டத்தில் ஆய்வு கண்டுகொண்டுள்ளது. பாதிக்கப்பட்ட சனசமூகங்களுக்கு நிதி, தொழில்நுட்பம், விசேடித்த பயிற்சியையும் விழிப்புணர்ச்சியையும் வழங்கக்கூடிய இயலுமை, என்பன கிடைக்கக்கூடியதாகச் செய்யப்படுவதால் இதற்கு மேலும் உதவி வழங்கப்பட்டுள்ளது. இவ்வகையான செயற்பாட்டாளர் பல்வேறு மட்டங்களில் பணியாற்றுவதற்கான உள்ளக இயலுமையானது, கொள்கையை நோக்கி மேல் செல்வது மற்றும் அடிமட்டத்திற்கு வருவது ஒரு பின்மதிப்பீட்டுச் செயன்முறையாக தொழிற்பட்டு, அதனுடைய பெரும் காலநிலை மாற்ற மாற்றுவிப்பை இயலச் செய்வதில் ஒரு பெரும் சொத்தாக உள்ளது. எவ்வாறாயினும் இப் பிரச்சினைகளில் பணியாற்றும் சிவில் சமூகக் குழுக்கள் சொற்பமானவையாகவும், சிதறியிருப்பதாகவும், மாதிரி மட்டத்தில் செயற்படுவனவாகவும் உள்ளன. இவ்வியல்புகளானவை பிரதான ஓட்ட கொள்கை வகுப்பாளர்களிடம் பெரிய அளவிலான பிரவாகத்தை உண்டாக்கி, அளவு மட்டத்தை அதிகரித்து போதியளவு செல்வாக்கை செலுத்துவதற்கான இயலுமையை வரையறுப்பதுடன், காலநிலை மாற்ற இசைவிப்பை, உள்வாங்குவதற்கு அல்லது ஏற்றுக்கொள்வதற்கு பிரதான ஓட்ட கொள்கை வகுப்பாளர்களிடம் போதிய செல்வாக்கு செலுத்துவதற்கும் தடையாக உள்ளது. மேலும் சிவில் சமூகக் குழுக்களனாவை எதிர்மறை ஒளியில் பார்த்துக், காணப்படும் அரச கொள்கைகளுக்கு அவ்வப்போது எதிர் விவாதம் செய்வதால் சமூகக் குழுக்கள் எதிர்க் குழக்களாகப் நோக்கப்படுகின்றன. சிலவேளைகளில் மிகப் பெரும் தடையாக இருப்பது என்னவெனில், சிவில் சமூகத்துடன் இணைந்துள்ள குறுங்கால சுற்றுக்கருத்திட்ட மட்டங்களாக இருப்பதுடன், பிரதான நீரோட்டத்திற்குள் உள்வாங்கப்படாத அல்லது நீண்டகாலம் நிலைத்திருக்காத அரச சார்பற்ற நிறுவனத் துறைகளும் ஆகும்.

குழு ∴ பயிற்சி மட்டத்தில் ஒவ்வொரு துறையும் சம்பவக் கற்கைகள் ஊடாகப் பரிசோதிக்கப்பட்டது. இக் கற்கையானது தற்போது உள்ள மாற்றமுறும் பழக்கங்களாவன குறைநிரப்பு வருமானம் மூலமாக மேற்கொள்ளப்படுவதை வெளிச்சம் போட்டுக் காட்டுவதுடன், குறைநிரப்பு வருமான மூலங்களாக செய்யப்படுவதையும், முற்றுமுழுதாக ஏனைய வகைச் செயற்பாடுகளுக்கு பிரதியீடாக அமையவில்லை என்பதையும் வெளிச்சம் போட்டு காட்டுகிறது. இதற்கான ஒரு உதாரணத்தை விவசாயத்துறையிலே தரம் குறைந்த நிலத்தில் முக்கியமான எதிர்ப்புப் பயிர்களை பயிரிடுவதன் ஊடாக காணக்கூடியதாக உள்ளது. அத்துடன் அது உச்ச விலைகளில் ஏற்ற அமைவிடச் சந்தைகளில் விற்கப்படுகிறது. சனசமூகங்கள் இதில் ஈடுபட்டிருக்கும் அதேவேளையில் அவைகள் நெல்லினை சம்பிரதாய முறைப்படி தமது பிரதான மூலமாக பயிரிடுவதைத் தொடர்ந்து கொண்டிருக்கிறார்கள். காலநிலை மாற்ற இணங்குகையானது இந்த மட்டத்தில் பொருளாதார இயலுமைகளால் செலுத்தப்படும் அதேவேளையில் செயற்பாட்டில் மாற்றங்களை வேண்டிநிற்கும் தற்போதைய சூழலியல் நிபந்தனைகளாலும் உதவப்படுகிறது. விழிப்புணர்வு தொழில்நுட்பம், சந்தைப்படுத்தல் தொடர்புகள் மற்றும் நிதியீட்டல் முக்கிய காரணிகளை வழங்குவதற்காக வெளிப்புற ஆதரவும் முக்கிய காரணியாக உள்ளது. யுத்தத்திற்குப் பிந்திய சூழமைவானது வாழ்வாதார மாற்றத்திற்கான மீனவத்துறையிலிருந்து உல்லாசப்பயணத்துறை வரைக்கும் செலுத்துவதற்கான ஒரு காரணியாக உள்ளது. இந்த மட்டத்தில் இணங்குகையில் வரையறை ஏற்படுத்தும் காரணிகளானவை, இணங்குகையில் தனிநபர்கள் எதிர்கொள்ளும் பொருளாதார இடர்ச் சுமையாகும். கிடைக்கக்கூடியதாக உள்ள தகவல்களானவை இப்போதுள்ள காலநிலை மாற்ற இணங்குகையாகவோ, அல்லது நீடித்து நிலைக்கும் முன்னுரிமையாகவோ கொண்டிராத துறை ரீதியான தற்போது பிரதான ஓட்டத்திலுள்ள நிகழ்ச்சி நிரலை தற்போது கிடைக்கக்கூடியதாக உள்ள தகவல்கள் ஆதரிக்கிறது.

ஒட்டுமொத்தத்தில் அடிமட்ட பிரயோகங்களானவை அநேகமான சந்தர்ப்பங்களில் சனசமூகங்களால் கைக்கொள்ளப்பட்ட அல்லது சிவில் சமூகக் குழுக்களால் ஊக்குவிக்கப்பட்ட வாழ்வாதார மாற்றங்களானவை குறுங்கால அடிப்படையிலான பொறிமுறை உடையனவாகவும், சுற்றாடல் ஊக்கத்தின் நிமித்தமாக நீண்டகால பழக்கமாற்றத்திற்கானவைகளாக அல்லாமல் பொருளாதார ஈட்டங்களால் தூண்டப்பட்டவையாகவும் காட்டுகிறது. (இது இணங்குகையாக கருதப்படுகிறது)

இணங்குகை தகைமைக்கான மிகச் சிறந்த பொறிமுறையை முன்வைக்கும் இவ் ஆய்வானது அதன் முடிவுகளை பின்வருமாறு தருகிறது:

மிகவும் முக்கியமாக மாற்றுவிப்புத் தகைமை என்றால் என்ன என்பதன் பொதுவான பார்வை அது எதைச் சாதிக்க இலக்கு வைக்கிறது என்பதும் கட்டியமைக்க வேண்டிய தேவையுள்ளதுடன் பல்வேறு மட்டத்திலுள்ள பல்வேறு பங்காண்மையாளர்களிடையேயும் புரிந்துகொள்ளப்பட வேண்டியதாக உள்ளது. ஒவ்வொரு மட்டத்திற்குமான கவனக்குவிப்பு இடங்கள் வேறுபட்டதாக இது ஏற்றுக்கொண்டதுடன், ஆளுகையில் கொள்கையானது வாங்கும் கொள்கையில் கவனம் செலுத்தியதுடன் துறை ரீதியில் பொருளாதார நிகழ்ச்சிநிரல்கள், தொழில்நுட்பம், இயலுமை (அறிவுச்சங்கிலி) என்பன முன்னுரிமையானதாக உள்ளன. அடிமட்டத்தில் பிரச்சினைகளானவைகள் பிரதானமானவையாக பொருளாதார செலுத்திகளாகவே உள்ளன. இத்தேவைகள் புரிந்துகொள்ளக்கூடியதாக உள்ளதுடன், பல்வேறுபட்ட மட்டங்களிடையே கொள்கையிலிருந்து செயற்பாட்டுக்கு பொருத்தப்பாடுகளின்மை அல்லது முரண்பாடுகள் இல்லாத நிலைமைக்கு இணக்கம் காணப்பட வேண்டும். நீடித்து நிலைக்கக்கூடிய செயற்பாடுகள் குறித்து பரலான தகவல்களானவை மேல்நோக்கியதாகவும், கீழ்நோக்கியதாகவும் இருக்க வேண்டும். அப்போது தான் கொள்கைகள் பிரதிபலிக்கப்படுவதுடன் அடிமட்ட யதார்த்தத்திற்கும் செல்லக்கூடியதாக இருக்கும்.

இணங்குகையின் விசேடத் தன்மையின் நிமித்தம் அது துறை, உற்பத்தி மற்றும் அமைவிடத்தால் செல்வாக்கிற்கு உட்செலுத்தப்படுவதனால் மிகவும் பரவலாக்கப்பட்ட இணங்குகை அணுகுமுறையானது பரிசீலிக்கப்பட வேண்டிய தேவையாக உள்ளது. மேலும் ஒவ்வொரு மட்டத்திலுமான இணங்குகைகளானவை நிதியீட்டம், தொழில்நுட்பம், இயலுமை என்பவற்றின் ஊடாக ஆதரவளிக்க வேண்டிய தேவையிருப்பதுடன் எதிர்காலத்திற்கான தெரிவுகளுக்காக விசேடித்த பிரச்சினை தீர்ப்பவர்களுடன் பரீட்சிப்பிற்காக வரவேண்டியதாகவும் உள்ளது. இப் பரிசோதிப்புகளின் வெற்றிகள் தோல்விகள் குறித்த தகவல்களைப் பரப்பவும் பரிமாறவும் என கூட்டங்கள் தேவையாக உள்ளன. இன்னுமொரு கவனத்தில் எடுக்க வேண்டிய முக்கிய விடயம் என்னவெனில் இணங்குகையுடன் சம்பந்தப்படும் நேர உட்கூறாகும். இது கொள்கை வகுப்பாளர்களின் மட்டங்கள் ஊடாக இரு வழிகளிலும், பங்காண்மையாளர்கள் ஊடாகவும் தனிநபர்களையும் சேர்த்துக்கொண்டு, விசேடித்த காலநிலை அச்சுறுத்தல் மற்றும் சூழமைவுகளின் பிரகாரம், காலநிலை மாற்றத் தாக்கங்களுக்கு எதிர்ப்புக் காட்டுவதை ஏற்படுத்திக் கொள்வதற்காக, முயற்சித்தல், தவறுவிடல், ஆய்வு செய்தல் ஊடான ஒரு படிப்படியான செயன்முறையாக உள்ளது.

1 Introduction

The global climate is changing considerably due to anthropogenic activities that increase greenhouse gas emissions. Developing countries with high populations and low economic status are more at risk to the effects of climate change (Jayatilake 2008, UNEP 2007). Within these countries the poor tend to be more at risk to climate change as they have less assets and resources to cope (IPCC 2007).

In Sri Lanka, climate change threatens to have a significant impact on sectors such as water, agriculture and health - geographically, the coastal belt is identified as a highly vulnerable area (GOSL 2010). In an island with 25% of its population living in coastal areas, coastal communities both rural and urban are at risk from the effects of rising sea levels, increasing temperatures, disasters such as floods and droughts and issues such as salt water intrusion (Jayatilake 2008). Apart from the population density in the coastal regions, 62% of industrial units and more than 70% of tourist infrastructure are located in Sri Lanka's coastal areas (MOE 2010b). "The coastal zone accounts for about 43% of the nation's GDP, so impacts on coastal settlements translate into substantial impacts on the nation's economy" (MOE 2010a, p. 9).

1.1 Setting the context: climate change, coastal zones and livelihoods

"The coastline of Sri Lanka is approximately 1,600 km long and hosts a number of interrelated coastal ecosystems, including bays, beaches, dunes, estuaries, lagoons and tidal flats. Found within these are a range of habitats such as mangroves, coral reefs. These coastal areas support a range of nationally important economic activities including tourism, fisheries and port developments" (Mangroves for the Future 2007-2010 – online).

Sri Lanka's coastal areas are heavily populated and the population density of these areas are expected to increase within the context of poorly or unplanned coastal development, poor governance and more intensive industrial activity (Mangroves for the Future 2007-2010 – online). Large tracts of the coastal belt are already pressured by a host of human induced environmental threats including pollution, coral and sand mining, erosion and depletion of mangroves, and these will be further exacerbated by climate change (Pallewatta 2010). Tourism, fisheries and agriculture play a substantial role in livelihoods of coastal communities and are directly or indirectly exposed to coastal vulnerability that, in turn increase the effects on poor communities which rely on these enterprises.

Sector impacts - Agriculture

The Agricultural sector employs 33% of the labour force and is mainly carried out as an informal business by landed farmers, casual and wage labour. The informal sector is 61.9% of those employed – within which 85.6% are engaged in agricultural activities (DCS 2009). Within this sector, in terms of climate change impacts, one of the main concerns is the effect on paddy cultivation. Paddy cultivation is the most widespread agricultural crop providing income and employment to a large segment of the population, especially in rural areas. It is also Sri Lanka's staple food crop. As a result, most of the information available on climate change and agriculture in Sri Lanka relates to paddy cultivation.

Impacts due to changes in rainfall

Dry zone rainfall patterns show an increasing number of consecutive dry days due to rainfall variability. In Sri Lanka, nearly 70% of the paddy cultivated is in the dry zone which has an average annual rainfall of less than 1750 mm. An increase in prolonged droughts in the dry zone is expected to lead to reduced agricultural productivity in rain fed and minor irrigated paddy lands (MOE 2010). However, it is also noted that depending on the modules used to calculate these changes there is considerable variation and difference of opinion on the changes in rainfall patterns, the degree of severity and the geographic effects to be expected (Eriyagama *et. al.,* 2010), this uncertainty in climate science affects long term planning.

Impacts due to increased ambient temperature

The effects of high temperatures are predicted to cause damages to crops. In paddy cultivation for example, if the plant is exposed to an ambient temperature that exceeds 35˚C even for 60-90 minutes at anthesis stage (flowering) it can result in a damaged crop (Punyawardena 2007). Punyawardena (2007) states that recent agro-meteorological observations in paddy growing areas have shown that the frequency of such temperature events have increased significantly in both dry and intermediate zones, especially during *yala* seasons leading to increased spikelet sterility. Punyawardena (2007) also states that high temperature regimes are expected to increase the evapotranspiration losses that lead to soil moisture stress conditions in upland crops. Soil moisture stress coupled with less rain, creates conditions of salinisation that have implications for productivity of agricultural lands, especially in the dry zone coastal areas (MOE 2010).

Increased temperatures are also likely to enhance the local scale convection, thereby forming more cumulonimbus clouds giving rise to high intensive rains and run-off that washes off the fertile top soil of arable lands. This can lead to subsequent siltation and eutrophication of downstream reservoirs and any other surface water bodies (Punyawardena 2007).

Impacts due to sea level rise

Being a small island, rising sea levels is one of the major concerns of climate change that can lead to salt water intrusion and erosion that reduces the productivity as well as the amount of arable land available for agriculture (GOSL 2000). Given that in coastal areas land is a very limited resource with competing interests for economic activities, human settlements, infrastructure, and conservation, the effects of sea level rise threatens to exacerbate the issue of land scarcity.

Rising sea levels also have implications on the availability and quality of fresh water in coastal regions by disturbing the hydraulic flows (especially in coastal areas with Regosol soil types). This will have consequences on the supply of irrigation water needed for agriculture in those regions (Punyawardena 2007).

Sector impacts - Fisheries

Although the impacts or effects of climate change on the fisheries sector has not been assessed or quantified widely, it is expected to have a wide range of impacts on the production, availability and breeding patterns of aquatic life (Jayatilake 2008). As stated in the Sector Vulnerability Profile on Agriculture and Fisheries prepared by the Ministry of Environment, which is the most recent compilation of climate related information in Sri Lanka, possible impacts of sea level rise, frequent storm surges and coastal flooding are given in Box 1.

Box 1 Threats to Fisheries Sector

Threats to marine habitats

- Loss or changes in coastal habitats and species distribution.
- Landward migration of coastal wetlands, resulting in the loss of freshwater and brackish water habitats important for coastal and marine fishery and coastal aquaculture.
- Net loss of wetlands in areas where coastal wetlands are unable to migrate to keep pace with sea level rise due to infrastructure or other forms of land uses.
- Adverse impacts on mangroves and coral reefs that are important breeding grounds for marine food fishery.
- Changes in salinity of lagoons and estuaries that may affect fish and crustaceans important for food fishery due to saline intrusion and coastal flooding.
- Increased incidence of disaster events (e.g. flooding and storm surges) would affect near shore habitats and associated fishery resources and near shore reefs. Storm surges can particularly affect reefs, which could lead to more serious coastal erosion and saline intrusion due to sea level rise.
- Damage to coastal habitats such as coral reefs, mangroves and sea grass beds due to climate change associated natural disasters and associated storm surges will affect availability of fish stocks for the marine fishery as they serve as feeding and breeding grounds for food fish.

Threats to coastal communities

- Loss of beach area due to sea level rise will affect beach seine fishery, which has already been adversely affected by anthropogenic factors that reduce beach access for fishermen. Further loss to this traditional fishery can have a negative impact on fishermen engaged in this occupation and their social systems, necessitating alternate livelihoods.
- Loss of beach area for beach seine operations due to sea level rise will further affect livelihoods. The revenue from this fishery accounted for over 40% of the total national fish landings until the early 1950s before the advent of motorised fishing crafts, but had dropped to a mere 5% of the total fishery by the late 1980s.
- Loss of beach area will also affect access to natural beach landing sites used by fishermen who use traditional boats and day boats.
- Loss of fisheries resources, due to degradation of aquatic conditions will also impact livelihoods - especially near shore fisheries, day boat owners.

Compiled from MOE, c, 2010 pp. 45 - 47

Sector impacts - Tourism

Sri Lanka's tourism sector is predominantly driven by coastal attractions. According to a visitor survey conducted by the Sri Lanka Tourism Development Authority, 62% of visitors to Sri Lanka cited the beach as their main reason to visit the country (SLTDA 2009). A range of tourism infrastructure and related businesses and services catering to beach tourism will be affected by climate change and coastal flooding. This has implications for the profitablity of this sector - a key economic driver in Sri Lanka.

The Sector Vulnerability Profile on Urban Development, Human Settlements and Economic Infrastructure prepared by the Ministry of Environment highlights the following threats to the industry:

Box 2 Threats to Tourism Sector

Threats to coastal tourism

Impacts of sea level rise and storm surges:

- As much of the tourism infrastructure is concentrated along the beach, it can result in loss of assets and revenue.
- The impacts from frequent storms can accelerate coastal erosion and cause flooding which could also negatively impact on beaches through the loss of land and shore front and could disrupt coastal tourism.
- A rise in sea levels and increased intensity of storm surges would increase the cost of coastal protection works where major investments have been made with regard to coastal tourist infrastructure.

Impacts of temperature rise and changes in rainfall patterns:

- Rising ocean temperatures and changing weather patterns could have substantial impacts on Sri Lanka's coastal habitats that underpin Sri Lanka's tourism product.
- Rising ocean temperatures and changing rainfall patterns may cause substantial damage to Sri Lanka's coastal wetlands, flora and fauna – such as coral bleaching and degradation of coral reefs and other ecosystems on land that attract tourists – and diminish Sri Lanka's appeal as a biodiversity hotspot.
- Energy consumption in the tourist industry may increase, as cooling requirements will increase with rising ambient temperatures.

Impacts of increased frequency/intensity of natural disasters:

- Disruptions to transportation networks due to natural disasters such as floods and landslides can significantly impact the tourism sector when mobility is reduced periodically.
- Areas affected frequently by natural hazards will be avoided by tourists who prefer less vulnerable areas.

Compiled from MOE, a, 2010 pp. 44 - 45

1.2 Dealing with climate change in Sri Lanka

At present, Sri Lanka has parallel approaches to addressing climate change vulnerability. On the one hand the government is tackling it at a policy level, where the development of climate change policies are at an early stage, while on the other hand affected communities based on their own knowledge or the support of non-governmental organisations (NGOs) and other agencies are trying to adapt at 'ground' level through practical applications. These interventions are trying to address climate related impacts; a few with that specific intention, but most as sustainable development strategies or as part of socio-economic development agendas (CEPA 2008).

This study aims to explore the coping strategies of the urban and rural coastal communities with regard to climate change and assess the effectiveness of actions vulnerable women and men in rural and urban areas are taking to cope with climate change impacts; and what features within these actions have to be considered in order to scale up these interventions so they can be included in national and sectoral strategies as adaptation measures.

One level of analysis will focus on the national and key sectoral level policies and strategies related to climate change, coastal areas and livelihoods that are either being developed or already in place. This paper examines how these policies are attempting to tackle and take into consideration issues related to climate change adaptation. Priority will be given to extract how ground level applications are incorporated or recommended into the policy formulation process. Data was collected through key person interviews and secondary data sources.

The second level of analysis will focus on the 'practice' in order to understand how decentralised local government and government agencies, NGOs, Community-Based Organisations (CBO) and the vulnerable communities themselves understand coping strategies and how communities (both urban and rural) are already coping with the adverse effects of climate change. It will aim to draw out what drives their decisions and actions to prioritise and select options. Information was gathered from secondary sources and primary sources in the form of key person interviews and focus group discussions.

2 Conceptual Framework and Methodology

While climate change is a global phenomenon with cross boundary effects and actors, this study will focus on how institutions and actors within the country are trying to address climate change. In order to get more in-depth information and follow a direct group of actors from national policy level to local implementation level, the study will be confined to the three sectors of agriculture, fisheries and tourism that are important livelihood sectors for poor people and also those deemed as highly vulnerable to climate change. The conceptual framework and methodology has been structured within these boundaries – of local actors and sectors.

2.1 Coping versus adaptation

Coping strategies are characterised as immediate to short term reactive responses to changes; it is an adaptive mechanism by way of survival in variable or uncertain situations (Berkes and Jolly 2001). Adaptation is a process of adjustment to the climate stimuli and the underlying ability of a community to adjust and cope, whether it is as a reactive response or an adjustment in anticipation of further impacts (Schipper 2009). It can be one that reduces the negative impacts and or capitalises on opportunities that can arise due to the prevailing circumstances (IPCC 2007).

In this study adaptive strategies will be considered as a longer term response, including a change of practices, such as changing behaviour or a change in the crop that is cultivated based on acknowledged long term climatic threats. Initial coping strategies may give way to longer term adaptive strategies as a way of dealing with reoccurring adverse events such as weather changes, storm surges, and periods of drought or intense rainfall. “Adaptation can manifest as either building adaptive capacity, by which we mean increasing the ability of an individual or group to implement adaptation actions, for example by learning, reading, gathering information, and research or adaptation can manifest as implementing adaptation actions i.e. taking action in response to or in advance of a stimuli, for example through building sea walls” (Tompkins *et. al.* 2009, p. 12). In our study we will differentiate coping and adaptation by examining the reason for the change coupled with the time horizon in relation to the strategy or practices that are employed by the individuals and groups.

2.2 Adaptive capacity

Adaptive capacity is defined as the “capabilities, resources and institutions of a country or region to implement effective adaptation measures” (UNEP 2009). A more comprehensive understanding of adaptive capacity is one that “broadly represents people’s latent ability to cope with and respond to a variety of shocks and disturbances, and can be defined as the pre-conditions necessary to enable adaptation, including social and physical elements, and the ability to mobilise them” (Nelson *et. al.* cited in Bunce *et. al.* 2010, p. 486). Establishing

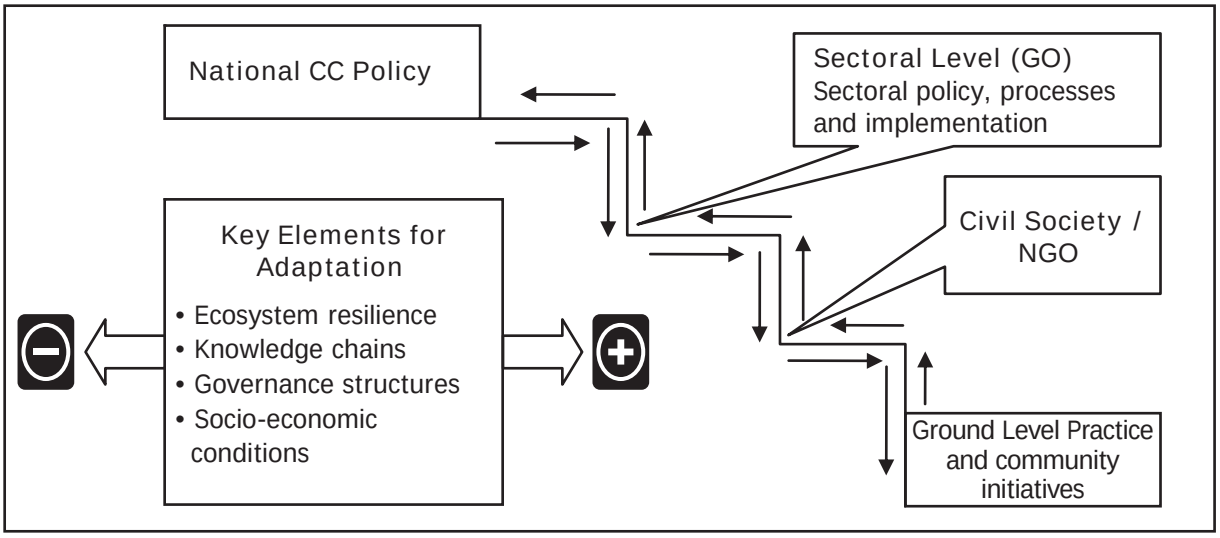
adaptive capacity also cuts across economic, social, cultural, political and environmental sub sectors that are inter-related and act as push-pull factors that are driven by internal or external characteristics, which can be either positive or negative factors to the elements that are critical to adaptive capacity.

As adaptation is a process of adjustment to the climate stimuli, the underlying ability of a community to adjust and cope whether it is as a reactive response or an adjustment in anticipation of further impacts will depend on the adaptive capacity of the community (Schipper 2009, Tompkins *et. al.* 2009, Klein *et. al.* 2008). In addition, it also involves a multi scale process that influences what communities are able to apply as adaptations. "Adapting to climate change involves cascading decisions across a landscape made up of agents from individuals, firms and civil society, to public bodies and governments at local, regional and national scales and international agencies" (Adger *et. al.* 2005, p 79). Given these complex relationships this study focuses on factors that influence adaptive capacities of communities based on key elements as elaborated in the literature, that are seen as critical to adaptive capacity:

- Ecosystem resilience - the ability to use and work within the natural ecosystem without damaging what is already in existence.
- Knowledge chains - access to information and information flow, capacity building and use of technical innovations.
- Governance structures and flow - how existing structures prioritise climate change issues and how climate change is integrated into development planning and implementation.
- Socio-economic conditions - assets, wealth and livelihood security that are also vital in how choices are made.

This conceptual framework proposes to examine how these different elements of adaptive capacity are addressed among the various stakeholders that cascade at different levels as described by Adger *et. al.* (2005). Different actors also tend to respond to the same stimuli/problem with different perspectives depending on their own capacities, agendas, experiences, their access to and control of resources etc. Therefore, the conceptual frame illustrated below uses an actor-based approach to understand the interactions that affect adaptive capacity.

Box 3 Illustrated Conceptual Framework



The frame has identified four levels of actors at national policy level, at a sectoral policy and implementation level, at a civil society level and at ground/community/practice level. It was decided that as this is an exploratory study, it will constrain the actors within a national context and also to direct actors. The pictorial depiction in terms of a cascading system also tries to place the actors within a most suitable level, but does not imply that these actors are static - hence the arrows upwards and downwards aim to depict the interactions of how policies can influence practice and vice-a-versa.

At each level of investigation, whether it is at national, sectoral, civil society or ground level, our study aims to bring to light the key elements to improving adaptive capacity. Through our study we will investigate the positive and negative drivers and pressures at each level and how they influence adaptive capacity at the ground level, and therefore the factors that will also affect scale up. The study aims to answer the following questions:

- What simulates the adoption of adaptation strategies?
- How do the different stakeholders aid adaptation?
- What are the features and issues to be addressed to aid scale up?

2.3 Methodology

The study focused on coastal areas, as they were identified in the literature as the geographic area with the highest risk to climate change in Sri Lanka. It is expected that an already degraded coastal ecosystem and its services will be further compromised due to climate threats which in turn also affect the coastal communities, especially the poor (Pallewatta 2010). Therefore, the study aimed to look at adaptation in coastal areas – selecting areas where impacts for the three livelihoods of agriculture, fisheries and tourism were high – and matching it with poverty data.

The sample sites have been selected according to a vulnerability mapping exercise done by the Ministry of Environment; based on the Intergovernmental Panel on Climate Change's (IPCC) vulnerability criteria: "The degree to which a system is susceptible to, or unable to cope with the adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity" (IPCC 2001). In this definition vulnerability can be expressed as a function of exposure, sensitivity, and adaptive capacity (Vulnerability = f (exposure, sensitivity, adaptive capacity)).

- IPCC (2001) defines *exposure* as "the nature and degree to which a system is exposed to significant climatic variations". This refers to the frequency and magnitude of climate impacts such as floods, droughts and sea level rise.

- *Sensitivity* is defined as "the degree to which a system is affected, either adversely or beneficially, by climate-related stimuli" (IPCC 2001). This indicator refers to human-environmental conditions that can either worsen the climate hazard or trigger an impact that in turn also affects human wellbeing and livelihoods.

- *Adaptive capacity* is "the ability of a system to adjust to climate change (including climate variability and extremes), to moderate the potential damage from it, to take advantage of its opportunities, or to cope with its consequences" (IPCC 2001). This indicator looks at "a function of wealth, technology, education, information, skills, infrastructure, access to resources, stability and management capabilities" (IPCC 2001).

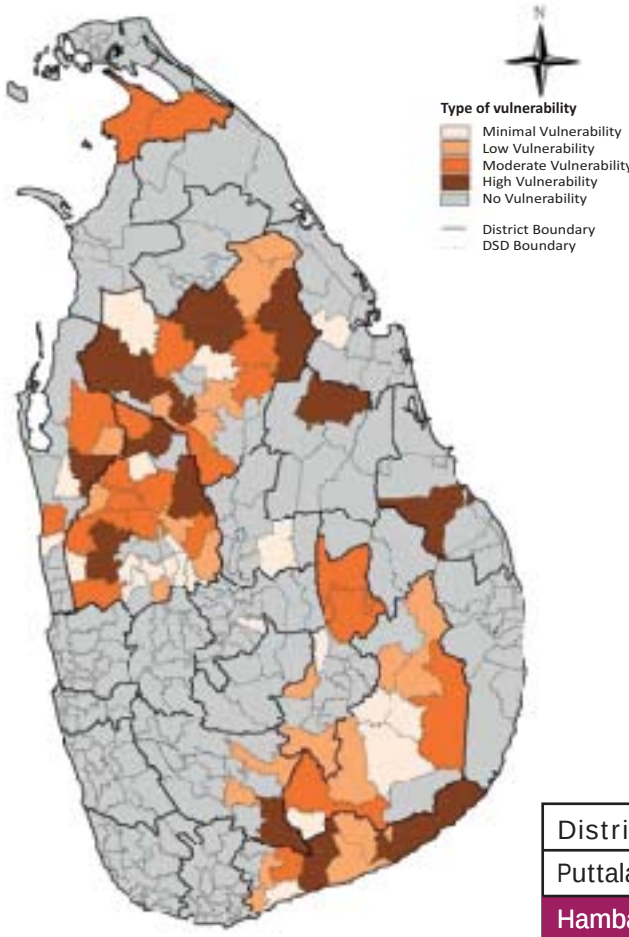
Based on the above criteria, composite vulnerability indexes have been developed showing varying degrees of affectedness based on different types of exposures and livelihoods. This mapping provided a mechanism by which sample areas could be ranked.

Site selection

Agricultural sector

Within the agriculture sector, paddy cultivation is seen to be the sector that will be greatly impacted by climate change leading to economic declines and food security problems with adverse effects on poor communities. Paddy is the major crop in Sri Lanka. Nearly 70% of paddy is cultivated in the dry zone where the annual rainfall is less than 1750mm. Therefore, in terms of climate threats, prolonged droughts and variation of weather patterns are seen to be the most significant climate threat.

Paddy area vulnerability with drought exposure



Sector specific indices for paddy:

Exposure Index:
- Frequency and magnitude of drought events

Sensitivity Index:
- Area of paddy cultivation

Adaptive Capacity Index:
- % of population above the poverty line
- % of females educated above grade 5 (among those engaged in agriculture)
- % of farmers' income not earned through agriculture
- % of paddy lands fed by major irrigation

Based on this mapping Ambalantota Divisional Secretariat (DS) Division in Hambantota was selected as the sample area for Agriculture as it is the most vulnerable in the coastal area. Anamaduwa DS Division in Anamaduwa that shows the highest sensitivity is not a coastal area.

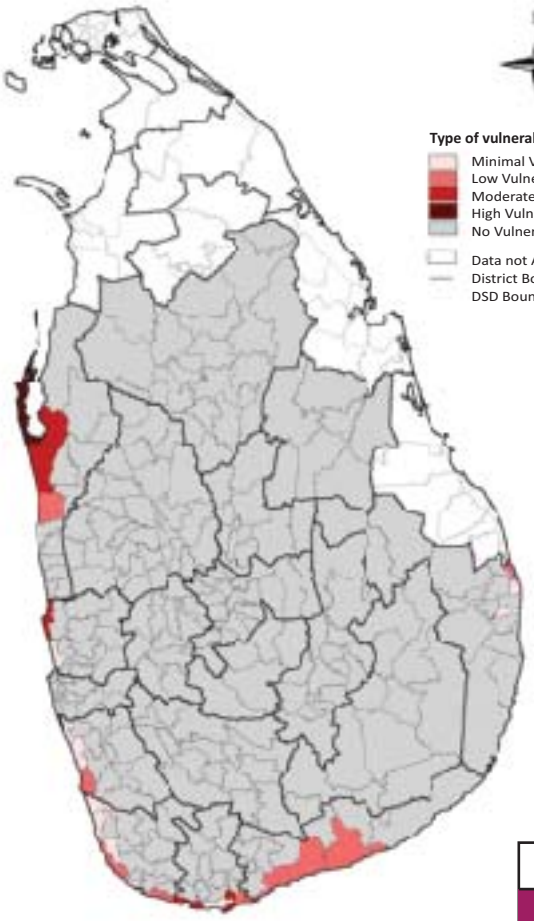
District	DS Division	Rank
Puttalam	Anamaduwa	1
Hambantota	**Ambalantota**	**2**
Kurunegala	Polpithigama	3
Ratnapura	Embilipitiya	4
Polonnaruwa	Medirigiriya	5
Kurunegala	Kuliyapitiya	6
Anuradhapura	Thalawa	7
Batticaloa	Eravur Pattu	8
Hambantota	Suriyawewa	9
Kurunegala	Panduwasnuwara	10

Source : MOE 2010 c (Vulnerability mapping)

Fisheries sector (marine fishery)

In the fisheries sector, one of the key climatic threats is sea level rise. The mapping of inundated coastal areas due to sea level rise and its effects on the fishery industry is given below:

Marine fishery sector vuinerability with sea level rise exposure



Marine Sector specific indices:

Exposure Index:
Sea level rise (1m)

Sensitivity Index:
- # of fisheries landing sites
- % of livelihoods dependent on fisheries
- AVG fishing yield over the last years

Adaptive Capacity Index:
- % of population above the poverty line
- % of population completing secondary education
- % employed in sectors other than fisheries

As shown in this map, the key areas sensitive to sea level rise and livelihoods are mainly in the north-west and therefore the Kalpitya DS Division was selected as the sample area.

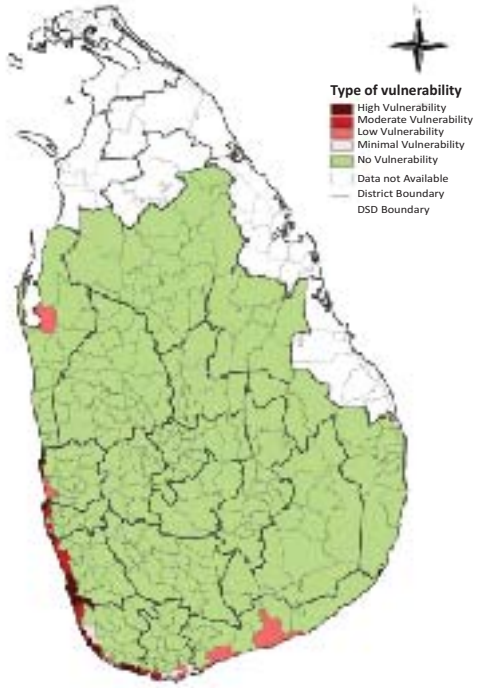
District	DS Division	Rank
Puttalam	Kalpitiya	1
Puttalam	Mundalama	2
Gampaha	Negombo	3
Matara	Devinuwara	4
Puttalam	Puttalam	5
Matara	Weligama	6

Source : MOE 2010 c (Vulnerability mapping)

Tourism Sector

In the tourism sector, the vulnerabilities are sea level rise and flooding, therefore both these aspects are mapped separately. Beruwala DS Division was selected as it ranked high in vulnerability to both sea-level rise and floods.

Tourism sector vulnerability with sea level rise exposure



Indices are based on housing and human settlement criteria:

Exposure:
- Sea level rise (1m)

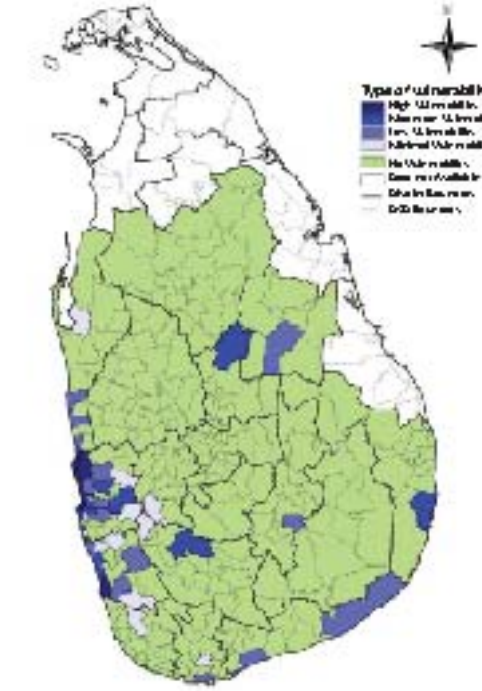
Sensitivity Index:
- % of livelihoods dependent on tourism
- Total # of guest rooms in hotels/guesthouses

Adaptive Capacity Index:
- % employed in sectors other than tourism
- % of population completing secondary education
- # of hotels / guest houses with over 15 room capacity

District	DS Division	Rank
Galle	Bentota	1
Kalutara	Beruwala*	2
Galle	Habaraduwa	3
Gampaha	Negombo	4
Colombo	Colombo	5

Source : MOE 2010a (Vulnerability mapping)

Tourism sector vulnerability with sea level rise exposure



Indices are based on housing and human settlement criteria:

Exposure:
- Frequency and magnitude of floods

Sensitivity Index:
- % of livelihoods dependent on tourism
- Total # of guest rooms in hotels/guesthouses

Adaptive Capacity Index:
- % employed in sectors other than tourism
- % of population completing secondary education
- # of hotels / guest houses with over 15 room capacity

District	DS Division	Rank
Colombo	Colombo	1
Kalutara	Beruwala*	2
Gampaha	Katana	3
Gampaha	Negombo	4
Gampaha	Wattala	5

Source : MOE 2010a (Vulnerability mapping)

Within these sample areas, specific communities were selected based on the prevalence of poverty in occupation groups. A study done by Gunewardene *et. al.* (2007) shows that poverty is higher among occupations such as agriculture and fisheries as well as those involved in informal jobs such as casual workers. A further breakdown of these groups such as those involved in rain-fed or small scale agriculture (mainly paddy), one day fishing and near shore fishing practices, small local guest house owners and tour boat operators (informal businesses) are seen as more likely to be poor, by this study. Therefore these groups were selected as the sample communities.

The Study was designed using a qualitative approach. The tools used for data collection were focus group discussions, individual interviews, key person interviews as well as literature reviews. Data was collected at all the steps/levels from policy to practice as described in the conceptual framework of this study.

Fifteen interviews were conducted with key informants in the policy level, sectoral level and civil society organisations which covered all three sectors. Though it was planned to do focus group discussions with the selected ground level communities in all three sectors, it could be done only in the fisheries community, as it was difficult to organise agricultural and tourism communities for a group discussion. Therefore, the president of the farmer group was interviewed on behalf of the agriculture group and randomly selected individuals were interviewed to get ground level information from the tourism sector. In the tourism sector, it was not possible to get interviews from the policy and sectoral level; while NGOs working in the civil society sector were not common. Therefore, most of the tourism data was from existing literature and also derived from a previous study on mapping stakeholders involved in climate change carried out by CEPA.

Table 1 Interview list

	Policy	Sectoral	Civil Society	Ground level
KPIs	3	5	5	6
FGDs				1

3 Modalities of Addressing Climate Change Adaptation

As per the conceptual framework, data was collected from various levels of stakeholders to gauge how they are attempting to address climate change.

Actions at the national policy level

The process of addressing climate change specifically is very new, from policy formulation through to implementation at ground level. The concept of tackling climate change related issues via policy is at its infancy in Sri Lanka, but it is supported by the government. The *Mahinda Chinthanaya* ten year development plan, the current president's development agenda recognises the need for sustainable development. Further to this, the *Haritha Lanka* action plan put out through the National Council for Sustainable Development is under the Presidential Secretariat and is chaired by the president himself. The *Haritha Lanka* plan is an action plan for sustainable development. The plan has short, medium and long term objectives with indicators to monitor progress and covers ten major areas such as solid waste management, greening industries, water management, clean air and conservation of flora and fauna.

Environmental issues have been given a more prominent role politically, through the acceptance and acknowledgement of issues from the highest level of government and a pledge to address them through the development process.

The main government entity entrusted with developing the policy for climate change, adaptation, mitigation and clean development mechanism (CDM) is the Ministry of Environment and Natural Resources. These policies are currently being developed through the Climate Change Secretariat.

Box 4 Objectives of the Climate Change Secretariat

- Provide a platform to address Climate Change issues at the national level.
- Serve as the dedicated institutional mechanism on Climate Change responses.
- Function as the repository databank of Climate Change information.
- Facilitate Climate Change related search and distribution of research results, to trigger policy reforms and actions.
- Establish a mechanism, to monitor impacts of responses to Climate Change.
- Liaise with the Secretariat to the UNFCCC.
- Serve as Secretariat for Designated National Authority for Clean Development Mechanism projects.

Source: Ministry of Environment, Climate Change Secretariat (online)

The development of the climate change policy is currently ongoing under the aegis of the Ministry of Environment and Natural Resources (MOE). It encompasses adaptation, mitigation and Clean Development Mechanism (CDM). While the overall policy is being formulated there are parallel initiatives taking place to develop a national adaptation strategy and CDM strategy, which are intended to be in line with the national climate change policy.

In addition, Sri Lanka is also finalising its Second National Communication to the UNFCCC that highlights 'gaps and constraints' pertaining to climate change in the national development agenda while improving natural resource management and sustainable development practices. The Second National Communication highlights that this should be done through "strengthening the technical and institutional capacity of Sri Lanka in mainstreaming climate change concerns into the country's sectoral and national development planning processes to meet its obligation to the UNFCCC" (GOSL 2010, p. 7).

"In developing the climate change policy which is still in the pipeline, there are four thrust areas that have been identified which are in line with the national development trajectory. The areas of focus in policy development are human settlements, economic drivers, food security and natural resources" (Academic, National Climate Change Policy Level, KPI).

"The idea is to mainstream climate change through overall planning, to fix ongoing issues and to incorporate it from the beginning" (Academic, National Climate Change Policy Level, KPI).

While the overall policy formulation process was initiated in 2008 and re-worked by a different entity in 2010 it has not been implemented as yet. In the meantime the CDM strategy is being reviewed, and the climate change adaptation strategy has just been finalised (as of December 2010). Box 5 describes the objectives, the strategy development process and key focus areas of the adaptation strategy. The process of how this will be implemented has not been worked out as yet.

Box 5 The National Climate Change Adaptation Strategy (NCCAS)

The development of the national climate change adaptation strategy followed five principles in the strategy planning and development process. These five principles were to:

1. Pursue pragmatic solutions, in line with the national development agenda.
2. Initiate processes to mobilise significant investments that can go beyond advocacy and put in place resources to support and sustain development.
3. Mobilise people/institutions to work towards integrated solutions that capitalised on interest and opportunities to mobilise resources for climate change adaptation.
4. Harness the wealth of expertise and knowledge already available in Sri Lanka through a consultative process.
5. Contribute towards developing the nation by seeking ways to ensure that Sri Lanka's development trajectory can be supported and made more climate change resilient.

The Climate Change Adaptation Planning Process was formulated in three stages.

1. The Sector Vulnerability Profiles (SVP) were prepared pertaining to key sectors of; Agriculture and Fisheries, Water, Health, Urban Development, Human Settlements and Economic Infrastructure, Biodiversity and Ecosystem Services. These profiles gave a comprehensive summary of the current situation for each key sector groupings and identified climate change impacts across the sector that needed to be addressed.
2. These SVPs were formulated and refined using a participatory process involving a range of stakeholders, individual consultants and key people to identify and prioritise areas for future intervention and investment.
3. These SVPs were then developed into a cohesive national adaptation strategy with clear programmes for action and investment based on strategic priorities.

Following on from the sector analysis, a framework was developed around five thrust areas:

- Mainstream climate change adaptation into national planning and development - through incorporating cross cutting policy measures, safeguards and monitoring programmes.
- Enable climate resilient and healthy human settlements - through promoting climate resilient construction methods and supporting climate change interventions through incentives.
- Minimise climate change impacts on food security - through improved practices in agriculture and fisheries production, efficient water management and irrigation management.
- Improve climate resilience of key economic drivers - through identifying climate change risks in the key economic sector, specific research and assisting key industries cope with climate change impacts through researching potential adaptation measures.
- Safeguard natural resources and biodiversity from climate change impacts – through natural resources management, enhancing the resilience of ecosystems and addressing the socio economic concerns resulting from climate change impacts on biodiversity.

Source: MOE 2010.

While the MOE is responsible for the overall policy it does not have the capacity or mandate to implement the various measures prescribed. These are very much subject to the sectoral buy in and existing structures in place in other ministries and departments to ensure that activities filter down to the ground level. This then becomes a participatory and negotiated process for the MOE to manage.

The MOE sees its role as a regulator and promoter but is not equipped with financial or technical resources to support activities carried out by other ministries. Therefore, lobbying for support and getting it to the highest level of development planning is the route chosen. As the MOE does not have an implementation arm to see the prescribed policies through to practice, it will rely on the various sectoral ministries to push through the sectorally relevant environmental agendas to ground level. Essentially, the MOE will be the shepherd of the environmental policy, responsible for formulation, engagement and co-ordination at the higher levels of government.

"Co-ordinating the ministries is perhaps the role of the environment ministry to force them to work together [in order to push through the environmental agenda]" (MOE, National Policy Level, KPI).

Sectoral policies, implementation and stakeholder links

It is accepted that climate change will affect a cross spectrum of areas and industry sectors; economically, socially and environmentally and there are national level efforts that are ongoing to encourage mainstreaming this issue into policy and implementation (GOSL 2010). Within our study we focus on three sectors: Agriculture, Fisheries and Tourism and a brief overview of the policy and their implementation structures and the roles of the different stakeholders are given below.

Agriculture sector

The agriculture sector is under the Ministry of Agriculture whose mission is to bring about prosperity to the nation through providing necessary guidance and co-ordination at a professional level, ensure productivity and efficiency of food, spices and allied agricultural crop sectors through policy implementation and enacting legislations. There are a number of divisions and institutions under the Ministry. Institutional responsibilities are based on types of activities (i.e. policy formulating, technology development, training, providing infrastructure facilities, etc.).

Out of these institutions, the Department of Agriculture and the Department of Agrarian Development are the key institutions that link the policies to ground level. The Department of Agriculture is the institution involved in achieving an equitable and sustainable agricultural development through the development and dissemination of improved agricultural technology. The Department of Agrarian Development is the key institution providing services and facilities (such as fertilizer provision, rehabilitation of minor tanks, establishment of farmer organisations, etc.) to farmers.

The policy and agricultural activities are framed under the objective of achieving food security. The policy also acknowledges and promotes the need to address sustainable principles as shown below:

- Increase productivity of water and land by enhancing crop production through the application of sustainable cultivation practices.
- Cultivation of crops based on agro-climatic conditions and promoting agro-based industries.
- Promote production and utilisation of organic and bio-fertilizers to gradually reduce the use of chemical fertilizers through Integrated Plant Nutrition Systems (IPNS).
- Encourage the use of efficient water management and moisture retention techniques to achieve high productivity in agriculture.
- Conserve the existing water resources for sustainable agricultural development.
- Improve efficiency of rain-fed agriculture through water harvesting, mulching and other appropriate techniques.
- Promote participatory irrigation management in maintaining and improving irrigation and drainage systems.
- Promote conservation of rain water and ground water.
- Increase water-use efficiency and promote modern and intensive irrigation technologies for water conservation.
- Promote land conservation within watershed areas.
- Strengthen rural credit institutions connected with farmers' investments, savings and risk management.
- Introduce appropriate agricultural insurance schemes to protect the farmers from the risks associated with natural calamities.

Source: Ministry of Agriculture 2009-2010, online

At present the main areas in which sustainable practices and climate change adaptation related activities are undertaken within the Department of Agriculture focus on research and development, training and taking technology, information to the ground.

When a new technology or a seed/plant variety is identified through a research and has been qualified for dissemination, the research institute disseminates it to the farmers through the Assistant Director of Agriculture (ADA) offices. Agriculture Instructors who are based within each Agrarian Service Centre are given training on the technology or variety and contact farmers to disseminate the information. Agriculture Research and Production Officers who are attached to the Agrarian Service Centres under the Department of Agrarian Development also help with information dissemination. It is mainly the Department of Agrarian Development that engages in the roles of administration and coordination. This is the institution that sets up farmer organisations and coordinates with them. It provides information related to the cultivation season (planting dates according to the available water in the minor tanks, recommendations of suitable varieties for a particular season, etc.) through seasonal meetings.

Box 6 Research on Paddy to address climate change

The Rice Research and Development Institute (RRDI) under the Department of Agriculture develops rice varieties with desired characteristics for rain-fed, unfavourable and problematic soil conditions such as iron toxicity, salinity, acid sulphate, low temperature, and flood and drought situations. The total cultivation area under these conditions is estimated to be around 30% of the total rice lands in the country and their present yield levels range between 2 - 2.5t/ha. Thus the varieties developed for these areas will help increase productivity under the said abiotic stresses.

Source: RRDI, Sectoral Level, KPI

Much of the information filtering down is based on conventional cultivation techniques and heavily focused on maximising yield and meeting production targets.

Within the Agriculture Department, there is an agro-climatology unit that collects climate data from agro-meteorology stations in the country. This information is used for making decisions on timing for paddy cultivation, quantity to be planted, timing of the opening of the irrigation channels etc., on an annual basis. This information then makes use of available climate data to provide farmers with information for decision making. Some of the community members and civil society groups interviewed expressed the need to have access to localised weather data more frequently to enable better decision making. The information is also not fully relevant to rain-fed paddy growers as they don't have access to water from the irrigation systems.

In addition to government institutions, there are other institutions which work directly or indirectly to improve the livelihoods of farmers; providing information, technical assistance, raw material supplies, infrastructure support, experimentation with crops, processing and marketing. Paddy being the staple for food security in Sri Lanka, has seen the most adaptations in terms of drought/flood resistant seed varieties, organic cultivation practices, water management, nutrient cycling etc. Most of the initiatives and assistance provided to farmers is based on livelihood support or sustainable agriculture practices while a few directly target climate change. Farmers have also been changing their practices over time to capitalise on markets and adjust to changing conditions using their own traditional techniques, experience and knowledge. The adaptations to paddy cultivation, however, are more reactionary to changing climatic conditions, using a blend of traditional knowledge and practices coupled with some modern technical support (seed varieties, growing information).

Table 2 A cross cut of activities showing the types of sustainable agriculture practices that are being promoted

Sector	Organisation	Intervention
GO	Department of Agriculture	Promotion of crop diversification, traditional crop varieties, organic matter application, promotion of soil and water conservation measures, and creating awareness among officers in the agriculture sector, provision of information and services etc.
GO	Crop research institutes (rice) RRDI	Crop specific research on productivity, management practices, drought/flood resistance varieties etc.
NGO	Lanka Jathika Sarvodaya Shramadana Sangamaya	Researching on traditional farming practices that help to reduce or tolerate environmental changes.
NGO	Practical Action	Promotion of traditional rice varieties to combat salinity, marketing links, advocacy.
NGO	Sri Lanka Nature Forum (SLNF)	Establishment of a local organic certification centre (SRI CERT), promotion of sustainable agriculture among communities, linking with academics to introduce seeds/crop management to farmers, awareness, advocacy.
NGO	National Federation for Conservation of Traditional Seeds and Agriculture Resources (NFCTSAR)	Production of traditional seeds and agricultural techniques, platform for farmers, awareness, advocacy.
Private Sector	CIC	Production of traditional rice varieties.
CBO	Total Development Association (TDA)	Sustainable agriculture and soil conservation in three villages.
	Eco Conservation Organisation (ECO)	Biodiversity conservation through promotion of sustainable farming.
	Lanka Organic Agricultural Movement (LOAM)	Restoration of agro-biodiversity through the dissemination of organic agriculture.
	Gal Oya Valley Community Development Foundation (GOVCDF)	Rehabilitation and protection of degraded farming lands into self sustaining farming lands.

Source: CEPA 2008

NGOs, given the more flexible nature of their operations, provide a valuable go-between that links the farmers to a range of support that may not otherwise reach them.

"Technology transfers coming from academic groups is sometimes not practical as in not relevant, sometimes the research is not used but kept within academic cupboards, we can help to bridge this gap and connect the farmers to the academics/researchers". (SLNF, Civil Society Level, KPI)

The NGOs also provide advocacy and are consulted when policies and plans are being made (including the national adaptation strategy), and therefore can bring field experience to the policy fora.

The sample site in Hambantota is a good example of how a range of stakeholders provided inputs to grow a saline resistant/traditional paddy variety to capitalise on a niche market while also adjusting to prevailing climatic stressors.

Case study: Traditional seeds that overcome salinity
Bundala, in the Bandagiriya Divisional Secretariat is located in the Hambantota District, in the south of Sri Lanka. It is in the low land, semi-arid coastal area of Hambantota. This area features a wetland ecosystem and the village borders the Bundala National Park (a Ramsar site) that encompasses five lagoon systems. The annual rainfall in the area is 1074mm, which allows for one good paddy season *(maha)* in the wet season, while in the dry *(yala)* season it is generally not possible to carry out rain-fed paddy cultivation.

The origins of the human settlement date back to the time of King Kavantissa who is said to have gifted this land to one of his "great warriors", the *Neela Maha Yodhaya.* The settlement was established as a store house for grain. In the 1900s when Leonard Woolf was the Assistant Government Agent in Hambantota, the government offered land for settlement in Bundala but people were reluctant to settle here as the area was forested.

In its more recent past the village was home to around 300 families, but many families have now migrated to the cities and other areas due to a lack of income and changing lifestyles. At present the village has 196 Sinhala families; out of whom about 40-50 receive *Samurdhi* welfare benefits. Facilities such as schools are available in the village while the main hospital is in *Hambantota* town 20kms away. The weekly market is in nearby *Deberwewa,* while the main market is in Hambantota town. The Agrarian office is within 10 minutes drive from the village.

Traditional livelihoods in the areas were rearing of livestock (for curd), agriculture (mainly paddy and *chena*), and salt production as a cottage industry. The composition of livelihoods has changed over time from livestock to agriculture due to clearing of land and the reduction of grazing land, and in the 1970s to agriculture (mainly paddy) and salt production with the establishment of the Salt Corporation in 1978, now run as a private company. The primary income source is divided between salt production and paddy cultivation (almost 50 – 50), with about 5% being employed in government service. Agriculture is also the main secondary income source (80%) with about 5% being self employed.

The growth of the paddy sector has been supported by irrigation improvements; however, a majority of the farmers still rely on rain-fed cultivation. More recently (after 2000), the fertilizer subsidy, the stable price for paddy and more irrigation improvements (cascade system - *wallimanna)* have also supported paddy cultivation. Table 3 provides some of the major income sources and how they have dealt with threats.

Table 3 Threats facing the main livelihoods and how they are coping

Livelihood	Issues faced	Coping strategies
Cattle rearing	Lack of grazing land.	Switching to paddy or working in salterns.
	Problems with cattle thieves.	Out migration (of youth) with education being seen as the path to better livelihoods.
	Youth not interested in continuing this livelihood.	
Paddy	Salinity – leading to reduction of land available for cultivation and reducing yields.	Experimenting with saline resistant traditional paddy in fields where hybrids cannot be cultivated *(ooraniya yaya).* This initiative has been supported by numerous donors and NGOs.
	Few markets for the traditional varieties.	Marketing links have been created for saline resistant paddy by NGOs. The health benefits of traditional paddy promoted by academics and private sector.
	Rainfall for only one season.	Some traditional irrigation improvements (cascading system) have been undertaken with UNDP support.
	Strong winds bringing in salt (affecting flowers/yield).	Growing wind barriers *(gliricidia, surya)* have been tried but not very successfully.
	Water stagnation.	
	Weather variability and prolonged droughts.	
Chena cultivation	Lack of rainfall.	Switching to paddy or working in salterns.
	No access to irrigated water/tanks.	Electric fences have helped keep elephants and pigs out – to some extent.
	Crop damage by animals (wild boar, elephants, peacocks).	
Salt production		Over the years formalisation and improved infrastructure has resulted in stabilising this income source.
Fuel wood extraction (for sale)	Banning of fuel wood collection in adjoining Bundala National Park.	This livelihood is no longer practiced in the area.
	Reduction of forest cover due to clearing of 6000ha for the Lunugamvehera irrigation scheme. Also leading to lack of rainfall.	

Source: Ground level, Sector level and NGO level KPIs

As shown in the table above salinity was one of the main deterrents to the paddy industry in the case study area. It led to large areas of paddy lands remaining uncultivated for over 20 years. This paddy land was called the *ooraniya yaya*. In 2005, there was a renewed interest in cultivating this land spurred on by a government programme to provide irrigation, new seed varieties, fertilizer and improved planting techniques to revive abandoned paddy lands. However, the attempts to revive this land were not successful and the Rice Research and Development Institute (RRDI) had deemed it unsuitable for cultivation. Some of the villagers were determined to find a solution and had got in touch with Practical Action (PA), who had been experimenting with traditional seed varieties to combat saline conditions. PA together with the National Federation for Conservation of Traditional Seeds and Agriculture Resources (NFCTSAR) carried out a series of awareness programmes to convince the community to experiment with several traditional varieties. There was much scepticism from the farmers as well as the Department of Agriculture who saw this as going back to primitive ways of farming. However one farmer, Weeraratne, was willing to champion the cause and he planted two varieties of traditional seeds as well as hybrid varieties in several plots in the abandoned paddy fields. At the end of the season one of the traditional varieties, *pachchaperumal* produced a good yield. This proved to be a catalyst for other farmers as well as to win the support of the Agriculture services.

The Agrarian Department worked with the farmer society, and the NGOs to enact the provisions of the Agrarian Development Act (no. 46) that allowed for farmers cultivating on abandoned lands to have sole rights to the paddy harvest for five years. They assisted landless farmers to sign MoUs with land owners for the use of their abandoned paddy lands. The Department of Agriculture provided seed paddy to start this project. Now several years later, *ooraniya yaya* has been revived to the benefit of the farmer and the environment through the use of organic farming practices.

"The yield we get is less, but we are cultivating on what was considered abandoned land, so this is a bonus". (President, Farmer Organisation, Ground Level, KPI).

"One of the other benefits is that the costs for inputs is less, it also improves soil fertility with the use of organic fertilizer." (PA, Civil Society Level, KPI).

The project was also assisted by UNDP, who helped access seeds and provided funds for irrigation improvements and CARE, who provided equipment and technical assistance for making organic fertilizer. This has also provided a new income source for some of the villagers.

While getting farmers to cultivate traditional seeds was one battle won, capturing a market was another. This too was overcome with support from Practical Action (PA) and NFCTSAR, who connected these farmers with buyers as well as farmer networks such as the Rural Enterprise Network (REN) that was already branded and recognised as organic/farmer to market products. The demand for traditional varieties was also aided by the larger private agriculture companies and academic research that promoted the health benefits of these products.

There is now a greater demand by farmers within this community to plant these paddy varieties, while the news has also spread into neighbouring areas. Together with the agriculture services and NFCTSAR, this farmer society is now providing awareness and outreach to other communities who face similar salinity issues.

Looking to the future the president of this farm group sees many positives: *"Hambantota is seeing much development. There will be more demand for food, for secondary crops (athuru boga), more variety, so we can use our knowledge and experience to capitalise on this. It is also supported by policies such as the 'appi wawamu rata nagamu' that have also used what we did in our village to change their attitudes and promote these types of interventions".*

Some of the future threats were identified as unpredictable rainy seasons and droughts. One of the tools that could help was seen as weather data collection at a very localised level as there are extremely varied winds in this area.

Fisheries sector

The fisheries policy has five objectives that stem from broad economic, social and environmental roots, as listed below.

- To improve the nutritional status and food security of the people by increasing national fish production.
- To minimise post-harvest losses and improve the quality and safety of fish products to acceptable standards.
- To increase employment opportunities in fisheries and aquatic resources related industries, and improve the socio-economic status of the fisher community.
- To increase foreign exchange earnings from fish and aquatic product exports.
- To conserve the aquatic environment.

Source: MOFAR 2006.

The fisheries sector contributes to the economic activity that takes place along Sri Lanka's coastal belt, an area which constitutes 25% of the island's population. The sector directly employs 208,731 and indirectly supports 2.5 million people and is a foreign exchange earner for the country through the export of fish, aquaculture and other marine products (MOE 2010).

It is a sector that is important nationally, both economically via foreign export and socially as it is a source of income and a form of livelihood, particularly coastal fishing. Due to the social and economic importance of this sector, it too has received much attention through the *Mahinda Chinthanaya* ten year development plan. Recognising that the sector's development will have an impact environmentally it has also been highlighted in the *Haritha Lanka* action plan. One of the main policy directives the fisheries sector shares with the agricultural sector is ensuring food security. The fisheries sector contributes to 70% of the nation's animal protein intake (MOFAR 2007) and so is a vital contributing factor to the health of the population.

Within this sector a direct attempt to address environment and climate change related issues takes place through the Coastal Conservation Department (CCD) and through the Coastal Zone Management Plan (CZMP). The CZMP objective is for a better coastal environment through the "protection and stabilisation of erosion prone beaches, establishment of beach parks, prevention and minimisation of coastal pollution (including water pollution), preparation of shoreline development plans, implementation of Special Areas Management Plans in ecologically sensitive coastal sites and the conservation of coastal habitats. These will form an integral component of the Fisheries Sector Plan" (MOFAR 2007, p. 17) as a way of simultaneously developing the sector yet managing the environment.

The latest Fisheries Sector Policy (2007-2016) is more implicit in tackling environmental issues, through the conservation of coastal and aquatic environments in its ten-year development plan. Through programmes of beach nourishment and bio-shielding on the coast these activities can be justified as climate proofing against sea level rise and erosion of the coast line. The ten year development policy framework for the fisheries sector has an implementation plan that the Ministry of Fisheries and Aquatic Resources has started to act on, incorporating environmental conservation and management areas. The focus on environmental aspects is tied in to alternative livelihoods, access to information and building on the ecosystem resilience of the coastal regions (MOFAR, 2007).

Through the development plan the ministry has addressed the need to reduce the vulnerabilities faced by the coastal and fishing communities. Measures such as infrastructure development i.e. landing sites and providing basic amenities, aiding coastal inhabitants to own the houses they live in, strengthening their organisations such as the co-operatives to help members access credit networks, inputs for fishing and training, access to healthcare and education are measures that will be addressed via the ministry's initiative to address social security in the fisheries sector.

Efforts to combat environmental degradation are also taking place through policy directives. A shift towards deep sea fishing and aquaculture to promote a change in livelihoods and stop environmentally destructive near shore coastal fishing activities has been channelled down to the ground level through the promotion of alternative livelihoods.

"Management measures are needed for coastal fishing as the highest number of people dependent on coastal fisheries, is linked to poverty, as well as dependence on livelihoods with environmental links. We need to focus on providing alternative livelihoods through education and awareness and to change their attitude towards the environment". (MOFAR, Sectoral Level, KPI)

The filter down within this sector is fragmented as it occurs through the ministry's departmental agencies and research arms such as NARA (National Aquatic Resources and Research Development Agency) and NAQDA (National Aquaculture Development Authority). The extension therefore is limited to where the ground research takes place and is specific to the location, such as areas that have lagoons or fresh water bodies, rather than wide spread adoption of the same measures.

The role of NGOs in developing sea fishing is not widespread and can be location specific due to the tsunami as well as the conflict situation that prevailed and discouraged sea fishing. The concentration seems to be either to move the communities into other types of aqua culture industries or out of it into activities like tourism. Below is an example of how communities with some support from an NGO are dealing with changes in livelihoods in the coastal area of Kalpitiya.

Case study: Small scale fishermen and new directions

The Kalpitiya region is located on the western coast within Sri Lanka's dry zone. It is a peninsula separating the Puttalam lagoon from the Indian Ocean. The area is a designated marine sanctuary with a variety of habitats such as bar reefs, mangrove swamps, flat coastal plains, saltpans, salt marshes and sand dune beaches. This area has also been affected by years of conflict where development in general was stunted and fisheries activities (especially coastal) were restricted due to security reasons.

The fishing community settled in the area in the 1960s tracing their roots back to the coastal city of Negombo, which is further south along the western coastline. Historically the village has always been a fishing community, engaged in fishing and associated livelihoods, with some members of the community engaging in agricultural activities in their home garden plots. Animal husbandry was practiced by a majority of the women as a secondary livelihood.

Fishing is the main income source of the village at present. However, some members of the younger generation have left the village to seek employment in other sectors. Some members of the community cultivate aloe vera as a secondary income source while others have turned to tourism related activities such as providing dolphin watching and coral reef tours as an alternative source of income to fishing. On the whole, there is an increased engagement of the villagers in tourism related jobs.

During the war the Navy had considerable control over the community's fishing activities - for security reasons. Fishermen were restricted as to where and what time they could fish. Due to the security restrictions imposed, fishermen were allowed to practice coastal fishing and destructive fishing techniques were not regulated. Since the war ended, the restrictions have been removed and fishermen are being encouraged to re-start off shore fishing. Stricter regulations and restrictions are also being enforced on coastal fishing. The fishermen were trained in alternative livelihood practices such as other aqua culture practices and taught non-destructive fishing techniques with the help of the Ministry of Fisheries and Aquatic Resources and NGOs. However, the community reports that the change to more environmentally safe practices has been difficult, even though they understand that their previous practices were destructive. The community stated that tighter regulations on destructive fishing techniques and coastal fishing have reduced income and they have found it difficult to recover from the sudden losses in income.

"Due to the restrictions we had earlier, in the past war period, people used quick, but illegal fishing methods. About 80% of people practiced illegal methods before. Though we understand the damage of such methods, it is difficult to return to traditional safe methods. We do not have the knowledge on safe methods and even they give only a little harvest. Therefore, without a good alternative people are having a tough time." (Fisher Community Ground Level, FGD).

Further to this, coastal erosion is another threat to their livelihoods. As coastal property erodes, some of the villagers have lost their land to the sea and as a result find it difficult to land their boats. They explained that the erosion was caused by improper coastal management i.e. the placement of rock barriers at a nearby village exacerbating the situation, the destruction of the mangroves, sand mining and illegal construction. However some villagers recognising their losing battle to the sea capitalised on the situation by selling their coastal lands to outsiders who were unaware of the coastal erosion. There has been much interest in the area since it was recently ear marked for tourism development projects. The Kalpitiya Dutch Bay Resort development project was launched in 2008; the plans include a diverse range of tourist attractions such as luxury accommodation, a golf course and theme parks.

This developmental interest is also proving to be a way for fishermen to cope with a dwindling share of fish stocks and the difficulties they face due to lower fish harvests. Due to the skills transfer the fishing community is involved in different livelihood practices, i.e. growing aloe vera that is harvested for the cosmetic industry and switching to tourism related activities that are still within their skill set (i.e. dolphin/boating tours). The skills transfer has been aided by NGOs such as the Marine and Coastal Resources Conservation Fund (MCRCF) and governmental involvement in training and awareness programmes to encourage alternative

livelihoods as a method of adapting to the prevailing environmental and economic conditions faced by the community. The switch to tourism related activities such as providing tours is an alternative that is aided by their native knowledge of the sea and coastal areas, and possession of basic equipment. However, they do not have the financial resources to modify their boats according to the safety and comfort standards set by the Tourist Board and the targeted tourist segment. The fishermen see tourism as a good income source and an employment generator for the future but find that poor infrastructure, inadequate lodging, regulations placed by the Department of Wildlife - the requirement of permits to visit the coral reefs and security checks by the Navy - a hindrance to the tourism services they could provide. In addition, the community's lack of English language skills hinders their ability to communicate with foreign tourists. However some members of the community are opposed to outsiders developing the area for tourism and do not envisage themselves integrating into the leisure sector, rather preferring to stay with or within their current occupation.

Tourism sector

The post war tourism sector, under the Ministry of Economic Development is orientated towards increasing profits from the tourist dollar. This sector is seen as a foreign exchange earner for the country that will contribute to national development. It is earmarked as a sector of high growth potential and has been highlighted in the *Mahinda Chinthanaya* as a sector of high priority. The tourism strategy is geared towards expanding the sector in Sri Lanka both to foreign and domestic tourists. The strategy however is very modest in terms of addressing climate change and sustainability, the focus of this policy is largely associated with reaping the economic benefits of tourism.

The tourism strategy has ten very clearly defined targets:

- To build a more diverse product range,
- To make Sri Lanka more accessible,
- To attract 1.5 million tourist arrivals per annum,
- To increase yield per tourist from US$80 to US$130 per day,
- To create an additional 7,000 rooms by 2016 with the right conditions,
- To further develop the East & North West with the development of existing sites and cities,
- To help traditional markets grow and open up new markets,
- To exceed world-class service levels and hospitality,
- To increase domestic tourism,
- To help the Micro Small Medium Enterprise (MSME) sector grow.

Source: SLTDA, National Strategy for Sri Lanka Tourism (online)

The ten targets set by the strategy are largely propelled by economic generation and improving the services provided by this sector to attract more tourists. While there is no policy *per se* the strategy highlights the socio-economic benefits of developing the tourism sector through helping the MSME and traditional markets grow. Unfortunately, the strategies do not have one that specifically focuses on protecting/caring for the environment, as a part of attracting tourists. The need to protect the environment to attract tourists was seen as important by local business operators.

"When the beach and shore is dirty it is difficult for the tourists to bathe and swim, the environment is very important" (Guest House Owner, Ground Level, KPI).

Sustainable interventions are seen more in terms of building niche markets such as eco tourism resorts, green buildings and waste management. However, this does not tackle the wider climate proofing type activities within the policy arena at this point in time. The strategy focus is mainly on improving the services provided by this sector and does not explicitly push an environmentally sustainable agenda. However, some of these activities in the coastal areas are part of the Coast Conservation Department under the purview of the Ministry of Fisheries and Aquatic Resources, which has had a more direct link to climate change resilience through infrastructure development and coastal buffer zones and coastal management plans.

The filter down process of climate change activities or information to the ground level does not exist within the mandate or operational modalities of the Ministry of Tourism. It works mainly on licensing and regulating ground level activities. The Ministry is also working to streamline large informal sector businesses and therefore capture locally owned and small establishments while giving such industries a platform and creating better income streams within a sector that is cornered by the 'big' travel and leisure operators. Beach tourism, on Sri Lanka's south coast, is an area where a large informal tourist sector is concentrated - in proportion to the rest of the country. Though there is no data available on the number of poor households engaged in the tourism sector, the type of work engaged in i.e. local guides, guest house owners, souvenir vendors can be taken as those that are more likely to be poor (Fernando and Meedeniya, 2009) and therefore more vulnerable to shocks either environmental or economic. Ways to alleviate or overcome such shocks, in particular on the coastal zone, a major tourism area, has not been addressed as part of the current tourism development strategy.

The private sector which is also involved in the country's tourist promotion activities are the drivers and growth engines in this sector. The private sector carries out sustainable practices, promotes ecotourism or corporate social responsibility (CSR) type activities, but this is not widely practiced. The case study informants stated, however, that some of the beach erosion structures put in place by the larger hotels protected the investments in the area. In this sector there have been less NGO level activities, however, since the Tsunami, several NGOs (i.e. International Union for Conservation of Nature (IUCN), Mercy Corps, Sarvodaya) have been involved in providing tourism options (eco-tourism, crafts, small enterprises) as alternative livelihoods for coastal communities.

Case study: Are the effects of climate change impacting tourism livelihoods?
Beruwela is a national holiday resort town located south of Colombo on the south western coast of Sri Lanka. The national holiday resort opened in 1969 and has since become the unofficial water sport capital of Sri Lanka and a very popular destination for tourists in search of sun, sea and sand.

Originally (post resort development), the main livelihood in this area was fishing. However, after the dedicated tourist resort area was put in place, many of the livelihoods support the tourism industry. The majority are engaged in tourism related activities such as owning and managing guest houses, souvenir selling and operating tours. The younger generation in this area continues to stay in this sector attracted by the lure of good earnings. This has been given a further boost by the end of the armed conflict. The greatest environmental concern faced by those involved in the tourism industry in this area, namely guest-house owners and tour boat operators, was pollution. Guest house owners expressed concern that a polluted beach and its surroundings make it difficult for guests to enjoy their holidays. Apart from environmental concerns and the delayed response of local authorities in finding solutions, other threats to tourism are the beach boys and souvenir sellers who harass guests along the beach and

outside the hotel premises thus spoiling their holiday experience. The tourist police have taken some steps to record and document the identities of the beach boys operating in the area by issuing them with identity cards. They have compiled a database of names and photographs so that complaints of harassment can be followed up by identifying individuals through this system. To overcome the environmental problems some guest-house owners have resorted to making private arrangements to collect and dispose of waste.

The tour boat operators highlighted the cleanliness of the surroundings and water bodies in which they conduct their tours and provide water sports facilities to tourists as their most important environmental concern. As many of the water sports and tour boat operators are located along the river and not on the shorefront like the four and five-star hotels, they are not directly exposed to the adverse effects of coastal erosion or coastal inundation. But they do report having observed a reduction in beach erosion after a sea wall was put in to protect the beaches in front of the high-end resort hotels.

In response to the changes in weather patterns (i.e. periods of rain which become an inconvenience to the guests' holidays), guest house owners and tourists alike adapt by working around the bad weather, opting for short excursions to explore nearby places of interest so that the entire holiday is not jeopardised by inclement weather.

Other threats perceived by guest house owners and tour boat operators were due to the recent financial crisis. Fewer tourists are spending more money on extras such as tours, shopping and water sports. Less money is spent by the tourists who opt for pre-paid all inclusive packages at the bigger hotels. This a problem for the smaller hotels that are unable to compete with the large hotels and for the tour operators since tourists who have already paid for their vacation are less likely to venture out of their hotels or have a reason to seek their services.

The smaller hotels and guests houses rely largely on repeat guests. Specialised hotels such as ayurvedic centres tend to cater to guests from certain regions i.e. the Benelux region, as a target group and have a strategy to attract guests for the future. Tour operators work with the larger hotels as service providers, and guests who are interested in tours or water sports are channelled to the local operators.

For both the small guest house owners and the tour boat operators there has been very limited livelihood assistance through the government tourism arms or civil society groups. The guest houses are inspected by the Tourist Board but no assistance has been given when changes to the buildings are required (i.e. better sanitation facilities). Tour operators who own boats have to be registered with the port and the Navy and have relevant identification and insurance arrangements. The Water Sports Association arranges meetings every two/three months to provide safety and training on water sports and water sports equipment.

Overall, guest house owners and tour boat operators are very positive about the tourism industry. They expect to see a rise in both foreign and local tourists to this well developed tourist area and look forward to the start of the tourist season. They also hope to welcome tourists from more non traditional regions i.e. India, the Middle East and Russia as part of the 'Visit Sri Lanka 2011' campaign. They are not adversely affected by climate change at present, and therefore do not feel the urgency to change or adapt. They are able to make small adjustments in their itineraries to cope with changes in weather so that tourists are able to experience some culture and history in rainy weather. The more pressing environmental problem is pollution of both land and water resources, which directly affects the future of the tourism industry in this resort belt.

4 Findings

4.1 Factors that drive decision making at ground level

The ground level data identified several factors/drivers that have led to changes in livelihood decisions – either within the sectors (i.e. switching crops) or reasons to move out of this sector. Table 4 describes the factors and the types of changes in each sector.

Table 4: Factors/drivers that affect livelihood decision making

Reasons	Fisheries	Agriculture	Tourism
Economic / markets	Switching to tourism. Also undertaking supplementary income sources - such as aloe vera, farming, shrimp/mussels.	Not changing practices in conventional paddy production but some interested in supplementary markets (i.e. traditional paddy, hi value crops).	Very much driven by economic incentive - have had reduced benefits during the war and some had switched to fishing.
Infrastructure development	Lack of landing sites seen as a problem for the industry in future.	Irrigation services increased paddy cultivation. In the study area - they switched due to an increase in other industries - i.e. salterns.	Have sustained business.
Post war Context	End of war removed restrictions on where and what time they are able to fish, however tighter regulations on fishing techniques (mainly coastal) have made some switch fishing techniques to off shore as well as into tourism. New opportunities to switch to tourism given the potential in area. Those with skills (i.e. for lobster fishing) can go to other areas - i.e. north and east. Increased range.	Study areas had no difference.	Increased focus on tourism - seen as having much better potential under the current context. For some areas it has also diverted tourists to other places earlier inaccessible due to the war (i.e. from south to east, and northwest). Tourist market has changed due to economic crises (from Europe to Asian tourists) and this has resulted in changes in spending and interest.

Reasons	Fisheries	Agriculture	Tourism
Environment changes	Near shore degradation (due to erosion and destruction of mangroves) resulting in loss of spawning grounds therefore switching to off shore or alternatives. Seasonal changes in sea conditions (i.e. rough seas during normally calm times restricts fishing.	Weather variability leading to short rotation crops. Salinity reduced amount of land under conventional paddy cultivation.	Pollution of water. Unusual winds limiting enjoyment/time spent outdoors. Seasonality/weather variability affecting tourism.
Selling of beach front land for other developments	Reduces landing areas.		Selling of beach front to external/big developments limits access to smaller operations.
Access to land/ Beach front	Land reduced also due to tourism development.	Land availability issues - due to national park & other developments.	Larger hotels own beach front property.
Migration – next generation	Younger generation more interested in tourism/other income sources.	Younger generation giving up farming to move to the city.	People moving into tourism businesses.
External training and support services	They have the equipment and skills for activities like diving and dolphin watching therefore switching to tourism that is more profitable. Training on aqua culture, agriculture products.	Outreach from agri. extension. Many inputs from NGOs for supplementary crops. Have undertaken niche market crops.	Has lead to greater gains to diversify activities (water skiing, deep sea fishing, whale watching).
Incentives	None available.	Government policies such as fertilizer subsidies allow farmers to afford chemical fertilizer that keeps them in conventional planting systems.	Now getting licenses and registrations to make the informal businesses more recognised.

Source: KPIs and FGDs in sample sites

As can be expected the common driver and priority focus for decision making of livelihoods is economic need and availability of markets.

For the tourism and fisheries sites another important driver has been the overall context of pre and post war. The fisheries community (in Kalpitiya) has been in an area where the conflict restricted movements and impacted their options. Now, in the post war era they are switching to tourism as a more popular and lucrative source of employment - in which they can use existing skills and benefit from the change in conditions. For the tourism site (Beruwala) a greater influx of tourists is leading to livelihoods remaining as they are. Environmental issues have also led to decisions - to switch practices, change crops for both the fisheries site and the agriculture site.

Another factor has been the role played by external support services to provide alternatives, options, and improvements. In the fisheries sector the focus has been on alternative livelihoods, while in the other two sectors the focus has been to provide inputs into existing livelihood categories. However, it is noted that in the agriculture sector, the younger generation is interested in migrating out, causing a problem with future labour requirements.

Coping versus adaptation

Examples from the ground show that most of the changes this study has captured through the case studies are also those promoted by the civil society groups or local level government extension arms. The changes are focused on coping - the changes/switches are mainly based on economic drivers and current context, while environmental conditions also play a role in encouraging the changes. However, the orientation is short term and more akin to survival strategies. While the Hambantota case study of experimenting with traditional seeds can be seen as having changed due to a particular local climate stimuli (of salinisation) and is geared to address a more long term orientation (change of paddy type), by capitalising on opportunities (niche market); it is also trying to win over various stakeholders and attempting to feed the experience up through the cascading chain of implementers and policy makers. This can be considered an adaptation.

4.2 Enablers and hurdles of adaptive capacity

As described in the conceptual framework, the adaptive capacity requires a combination of several key components - environmental resilience, knowledge chains, governance and socio economic conditions. This section discusses the enablers and hurdles based on these key components within the different levels of actors. (See Annex 2 and 3 for combined martix of enablers and hurdles across actors)

Table 4.1 Enablers and hurdles at national policy level

	Enabler	Hurdle
Ecosystem Resilience	• International concern on climate change.	• Uncertainty in the science. • Location and threat specific nature of action to be taken (not generalisable).
Knowledge chains	• Better understanding of climate change and its cross cutting impacts at the policy makers/decision maker level. • Using consultative methods to get stakeholder/sectoral buy in.	• Very new subject. • Not well understood, knowledge confined to academic levels. • Poor coordination between the ministries to share information.
Governance Structure	• Presidential backing for sustainable development. • Flexibility within the policy to consider the uncertainty of climate change. • Sectoral buy in and focus areas through integrated climate change strategy. • Institutional structures and developed administrative systems that can be used.	• Cross cutting nature of climate change requires ownership and buy in beyond the scope of the climate change policy. • Climate change policy has to be broad, hence cannot capture specific features. • No implementation arm - can only promote and lobby. • The decision making process doesn't focus on financial allocation for climate change related interventions. • Poor coordination between the ministries. • Greening is not mandatory.
Socio Economic	• The focus is on creating win-win situations that balance development/ growth needs with environmental protection/conservation needs.	• Very limited finances to promote ground level adaptation.

At the policy level in Sri Lanka the study found that climate change is recognised as important and there is a push towards sustainable development through an institutional greening agenda set by the president and convened by the Ministry of Environment with the involvement of twenty-two ministers from various sectors. This allows a forum for information exchange, cross fertilization of ideas, and synergies to be created at a very high policy level. However, activities are not mandatory.

Currently, a consultative approach is being utilised in the policy making process, to influence sectoral policies to include climate change needs as well as create greater understanding at the policy maker and decision maker levels of government, and to move knowledge of climate change and adaptation from being concentrated within the academic circles.

However, while there are institutional structures and administrative systems in existence that can be used to push through Climate Change Adaptation (CCA) to the ground, action is hindered by the environment ministry not having the luxury of an implementation arm. The ministry will instead have to coordinate, lobby and rely on other ministries to filter CCA activities and programs through on top of the sectoral mandates. This is further hindered with a lack of incentives and financial resources that can be utilised to garner implementation, leaving it up to the sectors to provide the stewardship needed for CCA.

Table 4.2 Enablers and hurdles at sectoral level

	Enabler	Hurdle
Ecosystem Resilience	• Overall sector policies recognises the need.	• New, not well understood, complex nature of the science.
Knowledge chains	• Ability to carry out sector/product based research (not for tourism). • Access to information. • Availability of technology.	• Sectoral agendas determine type of information that flows to the ground level (alternatives get low priority). • There are few mechanisms to feed information from the ground up to influence sectoral policy.
Governance Structure	• Existing implementation arms (not the same for all sectors). • Institutional structures and developed administrative systems that can be used for information, support etc. (top down).	• Mismatch between policy and what is practically possible. • Balancing of objectives - between food security, economic growth and sustainability. • New area, not properly incorporated into existing structures, therefore limited knowledge and capacity. • Short term planning that is also changing with successive ministers.
Socio Economic	• Post war context has created new opportunities for income and employment.	• Limited designated financial resources or fiscal incentives.

The key enablers stemming from the sectoral level were the sector specific research, extension and information services within the institutional structures. The ability to carry out sector based research and access information and technology has aided the absorption of environmental issues to some degree, especially in the fisheries and agricultural sectors. The ongoing research that has been taken to the grassroots level through existing extension and implementing arms within the administrative body has enabled farmers and fishermen to have information to change or adapt their practices within the sectors. This research and extension does not exist in the tourism sector. However, these practices are not the main focus of extension services - especially for agriculture, where the information and technology etc., are dominated by conventional farming needs.

The major hurdles at the sectoral level are that sectoral priorities of agriculture, fisheries and tourism each have their sectoral agendas and give priority to their own mandates which stem from their sectoral policies, i.e. food security, productivity and income. The sectoral priorities over ride the incorporation of CCA as the urgency to adapt is not felt and the understanding of climate change is not incorporated and as it is a new area, is not absorbed into the existing structures or plans. Poor coordination between the ministries to share information and collaborate also reduces the push needed to apply the policy as well as implementation at the ground level.

The lack of feedback mechanisms to feed information from the ground up, along with the uncertainties of the technical details and the specificity of actions i.e. specificity to the locations and to the climatic threats required, increase the difficulties of scaling up, inclusion into general practice and add to the cost of adapting. Furthermore, the short-term vision in the planning process and changes to government and ministers also hinder activities needed for CCA.

Table 4.3 Enablers and hurdles at civil society/NGO level

	Enabler	Hurdle
Ecosystem Resilience	• International concern and support. • Priority given to increase sustainable practices. • Can put in place location/threat specific interventions.	• Needs to be coupled with economic incentives.
Knowledge chains	• Access to wider knowledge and resources. • Bottom up information flow. • Bridging gap of new technology and traditional. • Applying the research in the field. • Use of media to disseminate.	• Mainstream not supportive. • Technology that is introduced not always practical or relevant. • Information flow to influence policy not well structured.
Governance Structure	• Ability to work at different levels - lobby for policy change, pilot at ground level. • Influencing local and provincial decision makers to support CCA activities. • Building collective voice through networks and lobbying for change.	• NGO/environmental lobby perceived as negative. • Certain government policies - i.e. fertilizer subsidy act as deterrents. • Short term nature of planning. • Mainstream not supportive - have to be convinced and sustainability requires their buy in. • Time bound projects, ownership, ability to build sustainable structures is problematic. • Scattered nature of interventions, make it hard to scale up.
Socio Economic	• Financial resources. • Promoting it as a supplementary or complimentary activity.	• Working with the most vulnerable, so not easy to find risk takers.

In terms of civil society groups, these actors have greater flexibility to give priority to sustainable practices. They have access to funds and technology that aid adaptation and can give specific training, education and awareness. These actors are able to work on different scales moving up to policy and down to the ground, essentially acting as a feedback mechanism. They can also bridge the technology divides, while working directly with the vulnerable groups to increase their adaptive capacity. Civil society and NGO groups were predominantly found in the agricultural sector i.e. farmer federations and in the fisheries sector in the form of fisheries co-operative societies, in addition to NGO support and assistance. In the tourism sector, however, this extension does not exist, the consensus from the guest house owners was that there was no support given to them. For tour boat operators, some support exists through the Water Sport Association and NARA.

Hurdles to adaptation at this level are that the number of civil society groups working on these issues are few and scattered and not adequate to generate a critical mass that can enable scaling up or force the mainstream to accept or absorb CCA. They are also faced with limited technical knowledge and capacity. In addition, the NGO lobby in Sri Lanka is perceived as negative and can at times oppose certain government policies, i.e. advocating organic

agriculture and opposing conventional agricultural practices and indicating that the fertilizer subsidy supplied by the government does not promote sustainable agriculture. Short term project cycles are another problem, as the projects continue only as long as there is NGO backing and are not absorbed into the mainstream.

Table 4.4 Enablers and hurdles at practice/ground level

	Enabler	Hurdle
Ecosystem Resilience	• Prevailing conditions leading to innovations.	• Although climatic threats are understood the need to act now, take preventative action is not priority (i.e. sea level rise).
Knowledge chains	• Champions – to be catalysts to take the risk to demonstrate to others. • Able to use existing skills and knowledge - to convert known practices.	• Types of information in the mainstream promotes status quo (agri extension, fisheries regulations). • Applications are scattered and longterm success is not high, hence lack of interventions to promote/learn from.
Governance Structure	• Support from extension services to a limited extent for sustainable practices.	• Existing sectoral priorities and subsidies counter argue CCA. • Limited support to promote CCA.
Socio Economic	• Support from external organisations - guidance, finances, technology (old /new). • Area and problem specific interventions. • Capitalising on niche markets. • Promotions of other benefits - environmental, health - externally driven.	• Economic needs drive decisions and prevent risk taking even if they understand the negative long term effects. • Limited links with green markets. • Limited access to raw material. • Can be labour intensive requiring time and effort. • Time needed for experimenting as well as to yield results - therefore no immediate gains - hence risky.

On the ground level, based on the case studies, changes in livelihood patterns can be classed as short term coping as opposed to long term climate induced adaptation. The foremost enabling factor is the economic benefit from changing.

At present, CCA is being tried out as a supplementary income source (i.e. in the agricultural sector through growing saline resistant crops in degraded land) that is benefiting from niche markets and premium prices. Prevailing environmental conditions and external support to adapt have also been factors that have driven adaptation at this level, particularly through external support and interventions increasing their capacity to adapt via awareness, education and funding.

Barriers to adaptation on this level have been the economic risk burden that would have to be faced in adapting. Further to this the information and support that is readily available supports the mainstream practices that support the sectoral agendas. The information and support on adaptation through the existing structures is limited as they are mainly pushing sectoral agendas over CCA and sustainability. In addition learning forums are limited, so not enough

exchanges of ideas and experiences are taking place to encourage greater support for adaptation. There are few incentives that encourage this switch. In addition some incentives (i.e. for organic fertilizer) are hindered by supply issues at the ground level.

"A method which cuts down the requirement of inorganic fertilizers was introduced in the policy. It was a very good method, but not practical. This is practicable only for the farmers who have a small extent of paddy lands, but it is not feasible for large scale farmers. Here it is difficult to find organic matter. Though we get garbage from urban councils, it costs a lot. At least there should be 5 year programmes to promote organic agriculture" (Agriculture Extension Officer, Sectoral Level, KPI).

5 Conclusion

At this very early stage of developing adaptive capacity in Sri Lanka, a clear understanding among the different actors on the characteristics of adaptive capacity is needed. At present this is seen to mean different things, the policy and sectors focus on the need to get buy in (governance), sharing information, technology development and capacity (knowledge chains). At ground level the issues are mainly on economic drivers and access to information and support. Although one of the main objectives behind adaptive capacity is ecosystem resilience this is the least important factor to many of the actors, hence this aspect is sidelined. The significance of having a vision of what adaptive capacity means and what it aims to achieve, needs to be built and understood among various stakeholders at all levels.

Given the cross cutting nature of climate change effects, building adaptive capacity, needs to consider how the various actors involved will act or react to the proposed initiatives. It is important to understand and unravel the context (macro and micro), vested interests, competing agendas, capacities and resources that exist amongst the actors. This involves looking at how the agendas of the different actors interact and counteract with regard to climate change adaptation and the need to capitalise on the existing enablers while taking action to address and minimise the hurdles. For example, it is necessary to reconcile specific enablers and hurdles at each level:

- Reducing mismatches between what is in the policy and what is practical – where for example organic fertilizer is advocated by the policy, but in practice farmers are not able to find/make the quantities of organic fertilizer. The chemical fertilizer subsidy also dis-incentivises the use of organic fertilizer.

- Balancing sectoral agendas and the climate change adaptation agenda – this is one of the most crucial challenges that need to be addressed.

- Adaptation at ground level must balance livelihood benefits with ecosystem requirements and this has to be supported and incentivised by actors along the chain.

- Access to information and better knowledge chains is also critical for adoption of sustainable practices – both through what goes down to the ground level and what learning is taken up to the policy level so that polices reflect and cater to ground realities.

Due to the specificity of adaptation to the product, location and climate threat a more decentralised approach may be more appropriate. This may also help to localise the activity and hence create more practical links amongst the actors. Adaptation at different levels needs to be supported by funding, technology, capacity and experimentation to come up with specific problem solvers in order to have options for the future.

At ground level, communities have started to recognise the need to adapt and are experimenting in relation to specific local conditions and livelihoods. These efforts need to be supported through the levels of actors, so that there will be tried and tested methods on ground for the future. It is also necessary to cultivate champions, identify those that are willing to take the risk at each level and cultivate these actors. Putting in place financial resources, technical knowledge – that combines old and new techniques – learning from science and the practitioners themselves will help to increase the rate of success of these interventions.

Another important aspect that has to be taken into account is the time component that adaptation involves. It is a gradual process that has to work both down through the levels of policy makers, and across through the stakeholders to get individuals on board and build resilience to climate change impacts through trial, error and research according to the specific climate threats and context.

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ANNEXES

Annex 1 List of interviewees

Name	Designation
Prof. B. Marambe	Professor - Department of Crop Science/Director - Agriculture Education Unit, Faculty of Agriculture, University of Peradeniya
Mr. Bhathiya Kekulandala	Project Manager Climate Change, Practical Action
Mr. Waruna Rathnabharathie	Project Manager Organic Agriculture, Practical Action
Dr. Parakrama Samaratunga	Research Fellow/Head of Agricultural Economic Policy, IPS
Mr. Nayana Mawilmada	Team Leader/Strategic Planning Specialist, Strengthening Capacity for Climate Change Adaptation ADB Technical Assistance
Ms. Anoja Herath	Assistant Director, Climate Change Secretariat, Ministry of Environment
Dr. W. M. W. Weerakoon	Head of Agronomy and Physiology Division, Rice Research and Development Institute
Mr. Thilak Kariyawasam	Coordinator, Sri Lanka Nature Forum (SLNF)
Mr. Hemantha Abeywardena	National Programme Coordinator, Farmer Federation for the Conservation of Traditional Seeds and Agri-Resources
Mr. Indra Ranasinghe	Director General (Technical), Ministry of Fisheries and Aquatic Resources
Dr. Thilak Ranasinghe	Deputy Chief Advisor/Agriculture and Marketing Expert, South CAP Project - Hambantota
Ms. W. A. Ramani	Divisional Officer, Agrarian Service Centre, Badagiriya
Mr. W. A. Prashad Madhushanka	Agriculture Instructor, Department of Agriculture
Mr. Atula Weerasekera	Field Training Coordinator - Southern Province, Farmer Federation for the Conservation of Traditional Seeds and Agri-Resources
Mr. G. L. Wimalasinghe	Divisional Officer, Agrarian Service Centre, Palakudawa
Mr. Sunil Mendis	Guest House Owner
Mr. T. Sunil Silva	Guest House Owner
Mr. Mohan De Soyza	Guest House Owner
Mr. Weeraratne	Farmer, Bundala
Semuthu Fishery Society, Kalpitiya	Fishermen and Aloe Vera farmers

Annex 2 Enablers to Adaptive Capacity

	National CC policy level	Sectoral level	Civil society/NGO level	Practice/ground level
Ecosystem Resilience	• International concern on Climate Change	• Overall focus recognises the need	• International concern and support • Priority given to increase sustainable practices • Can put in place location/threat specific interventions	• Prevailing conditions leading to innovations
Knowledge chains	• Better understanding of Climate Change and its cross cutting impacts at the policy makers/ decision maker level • Using consultative methods to get stakeholder/sectoral buy in	• Ability to carry out sector/product based research (not for tourism) • Access to information • Availability of technology	• Access to wider knowledge and resources • Bottom up information flow • Bridging gap of new technology and traditional • Applying the research in the field • Use of media to disseminate	• Champions – to be catalysts to take the risk to demonstrate to others • Able to use existing skills and knowledge – to convert known practices
Governance Structure	• Presidential backing for sustainable development • Flexibility within the policy to consider the uncertainty of climate change • Sectoral buy in and focus areas through climate change strategy • Institutional structures and developed administrative systems that can be used	• Existing implementation arms (not the same for all sectors) • Institutional structures and developed administrative systems that can be used for information, support etc. (top down)	• Ability to work at different levels – lobby for policy change, pilot at ground level • Influencing local and provincial decision makers to support CCA activities • Building Collective voice through networks and lobbying for change	• Support from extension services (to a limited extent for sustainable practices)
Socio Economic	• The focus is on creating win –win situations that balance development/growth needs with environmental protection/conservation needs	• Post war context has created new opportunities for income and employment	• Financial resources • Promoting it as a supplementary or complementary activity	• Support from external organisations – guidance, finances, technology (old /new) • Area and problem specific interventions • Capitalising on niche markets • Promotions of other benefits – environmental, health – externally driven

Source: KPIs and FGDs in sample sites

Annex 3 Hurdles to Adaptive Capacity

	National CC policy level	Sectoral level	Civil society/NGO level	Practice/ground level
Ecosystem Resilience	• Uncertainty in the science • Location and threat specific hence action cannot be generalised)	• New, not well understood, complex nature of the science • Uncertainty in the science	• Needs to be coupled with economic incentives	• Although climatic threats are understood the need to act now, take preventative action is not priority (i.e. sea level rise)
Knowledge chains	• Very new subject • Not well understood, knowledge confined to academic levels • Poor coordination between the ministries to share information	• Sectoral agendas determine type of work of information that flows to the ground level (Alternatives get low priority) • There are few mechanisms to feed information from the ground up to influence sectoral policy	• Mainstream not supportive • Technology that is introduced not always practical or relevant • Information flow to influence policy not well structured	• Types of information in the mainstream promotes status quo(agri extension, fisheries) • applications are scattered and long term success is not high, hence lack of interventions to promote/learn from
Governance Structure	• CC policy cannot be generalised • No implementation arm – can only promote and lobby • The decision making process doesn't focus on financial allocation for climate change related interventions • Poor coordination between the ministries • Cross cutting nature of CC requires ownership and buy in beyond the scope of the Climate change policy	• Mis-match between policy and what is practically possible • Balancing of objectives - between food security, economic growth and sustainability • New area, not properly incorporated into existing structures, therefore limited knowledge and capacity • Short term planning that is also changing with successive ministers	• NGO/environmental lobby perceived as negative • Certain government policies – i.e. fertilizer subsidy act as deterrents • Short term nature of planning • Mainstream not supportive – have to be convinced and sustainability requires their buy in • Time bound projects, ownership, ability to build sustainable structures is problematic • Scattered nature of interventions make is hard to scale up	• Existing sectoral priorities and subsidies counter argue CCA • Limited support to promote CCA
Socio Economic	• Very limited finances to promote ground level adaptation	• Limited designated financial resources or fiscal incentives	• Working with the most vulnerable so not easy to find risk takers	• Economic needs drive decisions and prevent risk taking, even if they understand the negative/long term effects • Limited links with green markets • Limited access to raw material • Can be labour intensive requiring time and effort • Time needed for experimenting as well as to yield results – therefore no immediate gains – hence risky.

Source: KPIs and FGDs in sample sites

Climate change is a global phenomenon that threatens to affect developing countries to a greater extent due to larger populations, less economic development and greater levels of poverty. The poor are also the segment of society that are more at risk as they have less assets and resources to cope with the effects of climate change. This situation challenges developing countries to meet economic and social development agendas while reducing the impacts to the environment; advocating sustainable pathways for development. This requires building 'adaptive capacity' that encompasses a country's capabilities, resources and institutions to effectively adapt or change its practices in order to achieve a sustainable balance between human and environment wellbeing.

In Sri Lanka, efforts to address climate change impacts and build adaptive capacity is in its early stages. Interventions are being advocated, tried and tested from policy to practice, involving a range of actors and sectors either addressing climate change directly or as sustainable or socio-economic development initiatives.

This study examines how the different actors at; the national policy level, sectoral policy and implementation level, civil society and NGO level and community level (practice), attempt to address climate change. The study uses an actor based approach to analyse elements that aid and impede adaptation at each level and highlights issues that can aid better climate change adaptation. The study focuses on agriculture, fisheries and tourism livelihoods of poor communities that are most vulnerable to climate change in coastal areas of Sri Lanka.

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