Chapter–5

Review of Literature

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Climate change effect on Agriculture

YEAR	SOURCE	AUTHOR	CONTENT
1996	The Second Assessment Report	IPCC	It describes the climate change impact on global agricultural production focusing on global agricultural production does not address the potentially serious consequences of large differences at local and regional scales. Many of the world's poorest people – particularly those living in subtropical and tropical areas – are most at risk of increased hunger.
1996	Agricultural impacts in Egypt	Strzepek and Smith	Adaptations in water resources (major river diversion schemes), irrigation (improved water delivery systems), agriculture (altered crop varieties and crop management), and coastal protection against sea-level rise were all tested. They achieve a modest 7–8% increase in agricultural sector performance compared to no adaptation, but together would be extremely expensive to implement.
1998	Handbook on Methods for Climate Change Impact Assessment and Adaptation Strategies	United Nations Environment Programme	Sensitivity to weather is greatest firstly in developing countries, where technological buffering to droughts and floods is less advanced, and secondly in those regions where the main physical factors affecting production (soils, terrain, and climate) are less suited to farming.
2001	Opening of a new mouth-A step to restore the ecosystem of Chilika lake- A Ramsar site of India	Pattnaik, A.K.,	Derives the impact of opening of new mouth in chilika of the flood plain that facilitated a quick and efficient discharge of monsoon flow reducing the problem of water logging, benefited the peripheral agriculture communities.He identifies that after the improvement of the drainage an average yield of 1.7 tons per acre from kharif and 2.5 tons per Acre from the rabi (post monsoon season) is achieved from paddy cultivation.

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2002	Coastal and Marine Ecosystems & Global Climate Change	Kennedy, V.S., Robert Twilley, Joan Kleypas, James Cowan, Jr., and Steven Hare	Warming temperatures would influence reproduction, growth, andmetabolism of many species in stressful or beneficial ways, depending on thespecies. Again, some species would thrive in a region while others declined. In addition to affectingthe interactions among species, this would require fishery and aquaculture industries in a region to beflexible in the species that are harvested or cultured.
	Lake Chilika-a Ramsar site from India and its ILBM Challenges	Pattnaik, A.K.	Describes the causes of lake siltation which impacts the decrease in salinity caused proliferation of invasive species, increased turbidity, shrinkage of water-spread area, loss of biodiversity, and depletion of fishery resources adversely affecting the livelihood of lake community &subsequently lead to complete crop loss, poverty and migration.
	CHILIKA DEVELOPMENT AUTHORITY		Extremely high population pressure, intense human activities, indiscriminate mechanisation of fishing, urbanisation,industrialisation,inappropriate resource use and absence of proper integrated management practices internalizing conservation contribute in reduction of productivity of coastal waters, quality deterioration, reduction in marine fish catch and finally posing hardship for livelihood to the local community.
	Lessons from the Chilika lake, India Institutional Coordination and Policy Development in Lake Basin Management	Pattnaik, A.K.,	Describes about importance of agriculture in coastal areas.Agriculture provides sustenance to 77% of the working population of the peripheral villages; 55% being engaged in cultivation and 22% as agricultural labourers. Water logging is highly detrimental to the floodplain agriculture. While paddy can sustain low to medium floods, prolonged water logging severely reduces crop productivity. Successive crop failures due to water logging compelled the local communities to undertake shrimp farming.
	INDIA - CHILIKA LAKE	Edwards, P.S.	Until the 1970s, the human population and fish production grew consistently at almost the same rate of about 2 percent per year & then came a phase of high population growth rates, which reached 4 percent per year in the 1990s. The people of Chilika believe the root causes of environmental problems are class conflicts, illegal encroachments, and the role of mafia, government, and politicians.

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2006	Uncertainties in projected impacts of climate change on European agriculture and terrestrial ecosystems based on scenarios from regional climate models: Climate Change	Olesen, J.E., T.R. Carter, C.H. Díaz-Ambrona, S. Fronzek, T. Heidmann, T. Hickler, T. Holt, M.I. Minguez	More frequent extreme climate events during specific crop development stages, together with higher rainfall intensity and longer dry spells, may impact negatively on crop yields.
2007	Coastal systems and low-lying areas. Climate Change(IPCC)	Nicholls, R.J., P.P. Wong, V.R. Burkett, J.O. Codignotto, J.E. Hay, R.F. McLean, S. Ragoonaden and C.D. Woodroffe	Describes impact of weather variation & climate change on distribution, production, and many other aspects of species and biodiversity in coastal ecosystems Human development patterns also have an important influence on biodiversity among coastal system types.
2008	Integrated Coastal Zone Management of Orissa coast - Gopalpur to Chilika and Paradeep to Dhamara	State Project Report	Identifies thatthe problem of coastal erosion has been increasing over the last few years at Pentha, a fishing village, located north of Paradeep. The Low Water Line has advanced by 340m from 2003 to 2007, indicating a rate of erosion of 85m per annum, which is severe. As a result, the beaches that are the nesting habitats of turtles were lost and the coastal land which is being mostly used for agriculture is facing a threat of salt water intrusion.
	Adapting agriculture to climate change	S. Mark Howden, Jean-François Soussana	Identifies that many potential adaptation options available for marginal change of existing agricultural systems, often variations of existing climate risk management. However, there are limits to their effectiveness under more severe climate changes. Hence, more systemic changes in resource allocation need to be considered, such as targeted diversification of production systems and livelihoods. It also argues that achieving increased adaptation action will necessitate integration of climate change-related issues with other risk factors, such as climate variability and market risk, and with other policy domains, such as sustainable development

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Climate change effect on Coastal Ecosystem

YEAR	SOURCE	AUTHOR	CONTENT
1998	Reefs at Risk: A Map-Based Indicator of Threats to the World's Coral Reefs	Bryant DL, Burke L, McManus JW, Spalding M	It describes about the coastal population growth which is widely recognized as a major threat to the coastal environment and to the well-being of its inhabitants. Globally 2.2 billion people or 39% of the world's population live within 100km of the coast. In coral reef countries, this level is even higher, with an average of 78% of people living within 100km of the coast, and close to a half billion people living within 100km of a coral reef
2001	Implication of climate change on sea level. In: Climate of the 21st century: changes & consequences	Sterr, H.	While sea level undergoes short-term and long-term changes, land levels are also subjected to vertical movement.
2001	Technological options for adaptation to climate change in coastal zones	Klein, R.J.T., R.J. Nicholls, S. Ragoonaden, M. Capobianco, J. Aston and E.N. Buckley	Describe three trends: (i) growing recognition of the benefits of 'soft'protection and of 'retreat and accommodate' strategies; (ii) an increasing reliance on technologies to develop and manage information; and (iii) an enhanced awareness of the need for coastal adaptation to reflect local natural and socio-economic conditions.
2002	Climate change impacts on U.S. coastal and marine ecosystems.	Scavia, D., J.C. Field, D.F. Boesch, R. Buddemeier, D.R. Cayan, V. Burkett, M. Fogarty, M. Harwell	Describes the impact & causes of climate change like drainage of coastal wetlands, deforestation and reclamation, and discharge of sewage, fertilisers and contaminants into coastal waters, extractive activities include sand mining and hydrocarbon production, construction of seawalls and other structures, harden the coast, change circulation patterns and alter freshwater, sediment and nutrient delivery.

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2002	Coastal and marine ecosystems & Global climate change-Potential Effects on U.S. Resources	Kennedy, V.S., R. R. Twilley, J.A.Kleypas, S.R.Hare	Most ecosystems can recover rapidly from hurricanes, but the anthropogenic alteration of coastal habitats may increase the ecological damage associated with more severe storms Coupled physical/biogeochemical models predict a net decrease (~5 %) in global productivity if atmospheric concentrations of carbon dioxide (CO2) reach a doubling of pre-industrial levels, increasing oceanic thermal stratification and reducing nutrient.
2003	World Lake Vision		It is estimated that lakes, both natural and manmade, store more than 90 percent of the world's surface fresh water resources. They are heavily used for a variety of human activities, including drinking, fishing, irrigation, navigation, and recreation.
2003	A global analysis of human settlement in coastal zones.	Small, C., and R.J.Nicholls	Describes about coastal density that 23% of the world's population lives both within 100 km distance of the coast and <100 m above sea level, and population densities in coastal regions are about three times higher than the global average. 60% of the world's 39 metropolises with a population of over 5 million are located within 100 km of the coast, including 12 of the world's 16 cities with populations greater than 10 million.
2004	Asian Journal of Water, Environment and Pollution: Climate Change and Coastal Ecosystems:An Overview	Ramesh, R., R. Purvaja	Impact of climate change & sea level rise. The Bay of Bengal has recorded the maximum annual sea level rise of 2.42 – 4.87 mm within the Indian coast. Sea level rise has implications for salinity as well as livelihoods of coastal communities in Chilika.
2005	Coastal Ecosystems Response to Climate Change and Human Impact in the Asia-Pacific Region (CERCCHI Project)	Nadaoka, K.	Coastal ecosystems are severely damaged: over 80% of the reefs are at great risk;mangroves have lost 70% of their cover in the last 70 years;seagrass bed loss ranges from 20-60% in the last 50 years

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2007	Surface and atmospheric climate change.	Trenberth, K.E., P.D. Jones, P.G. Ambenje, R. Bojariu, D.R. Easterling, A.M.G. Klein Tank, D.E. Parker, J.A. Renwick	Observed a number of important climate change-related effects relevant to coastal zones. Rising CO2 concentrations have lowered ocean surface pH by 0.1 unit since 1750.
2007	Oceanic climate change and sea level	Bindoff,N., J.Willebrand,V.Artale,A. Cazenave, J.Gregory, S.Gulev,K.Hanawa,	Global sea levels rose at 1.7 ± 0.5 mm/yr. through the 20th century, while global mean sea surface temperatures have risen about 0.6°C since 1950, with associated atmospheric warming in coastal areas.
2011	Odisha Shoreline Change Assessment Report	The National Center for Sustainable Coastal Management, Chennai and Institute of Ocean Management	Comparing the 1972 shoreline with 2010, it was concluded that the Odisha coastline, on an overall, is an accreting coast. However, 37% of the coast has been identified to be undergoing erosion and requires management.
2013	Integrated Lake Basin Management Workshop	Chilika Development Authority in collaboration with International Lake Environment Committee Foundation, Japan	The Integrated Lake Basin Management (ILBM) offers a framework for sustainably managing and conserving lakes and their basin resources, taking into account the three features of lentic water system, i.e. 1) integration of the nature and human activities in the basin, 2) long retention time,3) complex response dynamics within the lake.
2013	Chilika: Newsletter	Wetland Internatioal-South Asia & CDA	Describes about biophysical vulnerability and social vulnerability. The biophysical vulnerability assessment focuses on ecological character in more physical sense, akin to the conventional physical vulnerability assessment. Social vulnerability assessment on the other hand focuses on the exposure of communities living in and around the wetland system to the impacts of hazards. Livelihood systems become the entry point of social vulnerability analysis.

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2013	Chilika: Newsletter	Wetland Internatioal-South Asia & CDA	Mahanadi River Basin level climate modelling studies indicate changes in precipitation patterns, impacting temporal variability of the freshwater flow regimes. These changes will have an impact on salinity gradient, which is a key determinant for wetland biota and ecosystem services. Unmanaged tourism beyond carrying capacity of the wetland system would create stresses on biota (for example Irrawaddy Dolphins) and ecosystem services. Major elements affected include food availability, drinking water source, sanitation, ponds and grazing lands reported by more than 70% of the villages in Chilika coastline.
2013	The Economics of Ecosystems and Biodiversity for Water and Wetlands	Patrick ten Brink, Daniela Russi, Andrew Farmer and Tomas Badura	Global and local water cycle are strongly dependent on wetlands. Without wetlands, the water cycle, carbon cycle and nutrient cycle would be significantly altered, mostly detrimentally. Wetlands are solutions to water security – they provide multiple ecosystem services supporting water security as well as offering many other benefits and values to society and the economy.

Social Change

YEAR	SOURCE	AUTHOR	CONTENT
1976	Assessing the Impact of Planned Social Change	Donald T. Campbell	Social implementation, change and impact measurement have to do with the social psychology of interaction between citizens and projects, or between citizens and modes of experimental implementation or between citizens and the special measurement procedures introduced as a part of the evaluation.
1991	Extension Communication and Management	G.L.Ray	Describes various aspects and patterns of social change and factors associated with the acceptance of change.

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1994	The social construct of climate and climate change	Nico Stehrl, Hans von storch	It discusses about different time scales of climate change and their differential perception in society. Develops the concept of a 'social construct of climate' as decisive for the public perception of scientific knowledge about climate and for public policy on climate Change.
1999	Ethnoecology:-knowledge,-resources and- rights: "Traditional pastoralism and development. A comparison of Aymara and Navajo grazing ecology."	Kuznar, L.A.	The paper presents some examples that demonstrate how anthropologists can use a combination of ecological analysis and an anthropological appreciation of social factors and indigenous knowledge to improve understandings of traditional pastoral systems.
2004	Successful adaptation to climate change across scales	W. Neil Adgera, Nigel W. Arnella, Emma L. Tompkinsa	It derives the nature of adaptation and the implications of different spatial scales for these processes & outlines a set of normative evaluative criteria for judging the success of adaptations at different scales. It argues that elements of effectiveness, efficiency, equity and legitimacy are important in judging success in terms of the sustainability of development pathways into an uncertain future.
2005	Theories of Social Change	Diana Leat	Describes theories, models and applications of societal, organisational/institutional, individual and group change.
2009	Beyond the ABC: climate change policy and theories of social change	Elizabeth Shove	Describes yawning gulf between the potential contribution of the social sciences and the typically restricted models and concepts of social change embedded in contemporary environmental policy in the UK, and in other countries too. As well as making a strong case for going beyond what I refer to as the dominant paradigm of `ABC'-attitude, behaviour, and choice & also discusses the attractions of this model, the blind spots it creates, and the forms of governance it sustains.

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	Enhancing Resilience in Social-Ecological Systems: A Quantifiable Framework for Adapting to Change	Meha Jain	This paper reviews the most highly cited studies that empirically identify the drivers of adaptation to climate change, from the fields of human ecology, anthropology, psychology, and economics. The primary factors that are cited are 1) strong institutions and networks, 2) social memory and previous exposure to disturbance, 3) access to capital, 4) cognitive factors, such as perceived risk and ability to adapt, and 5) diversification of livelihoods. Also describes about Resilience in Social-Ecological Systems.
2012	Social ecology of Tea gardens in India: Perspective of global warming	Sankar Acharya & Sneha Bera	Describes about various social changes due to climate changes & wisely estimates and analyses the change Dynamics of social ecology.

Livelihood

YEAR	SOURCE	AUTHOR	CONTENT
1991	Sustainable rural livelihoods: practical concepts for the 21st century IDS Discussion Paper. Insitute of Development Studies.	Chambers and Conway	Describes about Sustainable Livelihoods and approaches.
2002	Journal of Forest and Livelihood: "Integrating People and Nature"	Sharma, Paudel, Naya	It argues that Protected Area Approach involves enormous social Cost in terms of limiting livelihoods opportunities to local people. It suggests a social ecology perspective to balance conservation and local livelihoods.
2003	Report of the Caribbean Coastal Co-management Guidelines Project, Barbados	Mc Conney	suggests the term "complementary livelihoods" to denote livelihoods which are in some way similar to fishing, but recognize that "people who work by the sea often cling tenaciously to their main lifestyle as an expression of their culture and personality"

2006	An Analysis of Rural Livelihood Systems in Rainfed Rice-based Farming Systems of Coastal Orissa	P. Samal, B.C. Barah and S. Pandey	As against the general impression that crop income dominates household income, it is observed that the non-farm income has emerged important in the coastal Orissa. Rice, which has been traditionally the main source of income in this area, has slipped to the third position, next to remittances and income from non-farm activities. The income from non-farm works and rice has accounted for 71 per cent and 20 per cent of the total income, respectively. The non-farm sources have contributed more than 90 per cent towards income inequality.
2007	Livelihood approach as a conservation tool	Ronan Roche	Describes about livelihood, sustainable livelihood, various livelihood strategies, and livelihood planning tools. Strategies include short-term considerations such as ways of coping with shocks and managing risk. Livelihood strategies can be positive, helping households become more resilient, or negative when they result in the further erosion and decrease of the asset base.
2007	Livelihood approach	Ronan Roche	Provision of new livelihood activity = Time is spent engaged in new activity = Decreased time spent engaged in traditional extractive activity = decreased utilization of resources=increase in biodiversity/conservation
2008	Urbanisation and livelihood in coastal India An Empirical Analysis	Sanjay Rode	Describes threats to coastal livelihood due to important developments like intensive agriculture, aquaculture, mining & quarrying, infrastructure development, industrial development, tourism and increasing urbanization etc. Also describes the salinity profile of the coast

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2009	Impacts of climate variability and change on fishery-based livelihoods	Marie-Caroline Badjeck ,Edward H. Allison a, Ashley S. Halls d, Nicholas K. Dulvy	Draws by using a livelihoods framework, synthesizes the path ways through which climate variability and change impact fisher-folk livelihoods at the household and community level. There is increasing concern over the consequences of global warming for the food security and livelihoods of the world's 36 million fisher folk and the nearly 1.5 billion consumers who rely on fish for more than 20% of their dietary animal protein.
2013	Chilika: Newsletter	Wetland Internatioal-South Asia & CDA	The average annual household income within Chilika basin was assessed to be Rs. 25,292 as compared to state average of Rs. 61,313. Limited access to formal credit institutions makes Chilika coastal communities even more vulnerable with more than 50% of households owing credit to middlemen/ fish traders. Communities in western catchment and Mahanadi floodplains have more organized financial institutions with 86% households and 43% households taking credit from SHGs. In Chilika basin, 40% of households are member to SHGs

Global warming

YEAR	SOURCE	AUTHOR	CONTENT
1998	Handbook on Methods for Climate Change Impact Assessment and Adaptation Strategies	The United Nations Environment Programme (UNEP)	Climate Change Country Studies can be divided into four related activities: 1. Greenhouse Gas Emission Inventories 2. Mitigation Studies (Greenhouse Gas Emission Reduction Studies) 3. Impact Assessment and Adaptation Studies 4. National Communications.

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2008	The Effects of Global Climate Change on Agricultur	1Cumhur Aydinalp and 2Malcolm S. Cresser	Topics concentrate possible physical effects of climatic change on agriculture, such as changes in cropand livestock yields as well as the economic consequences of these potential yield changes. This study reviewsthe effects of climate change on agriculture. The main interests are findings concerning the role of humanadaptations in responding to climate change, possible regional impacts to agricultural systems and potentialchanges in patterns of food production and prices.
2011	Effect of Global Warming and Climate Change on Coastal Zones and Sea Level	K.C.Jena Moon Rani Mishra	Global warming and the subsequent rise in sea levels would cause frequent floods in the coastal zones. Every year temperature is rising due to these greenhouse gases by about 0.2 degree centigrade indicating that the temperature will rise by nearly 5 degrees within a few years. The sea level along much of the US coast is already rising at a rate of 2.5 to 3.0 mm per year or about 10-12 inches per century.
2013	Social and Economic Effects of Global Warming	Daniel H.	Climate change affects food production across the globe which is badly threatened due to increasing levels of carbon dioxide entering the atmosphere. This has affected the overall health of people, especially those living in third world countries. In some instances, it may result in social conflicts and war as communities fight for food or clean water.

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