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# Role of Institutions in Conservation of Wetland Along with Maintaining Sustainable Livelihood to its Locals - A Review

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## Abstract

Wetlands are very productive in nature and are a source of livelihood for the local dwellers. Along with its natural beauty, it provides numerous valuable services like flash flood reduction, pollutant removal, groundwater recharge and discharge, habitat for numerous wildlife etc. They are considered as the arteries and veins of the landscape. But recent years evidenced degradation of wetlands all over the world. In order to protect and develop the wetlands a detrimental role can be played by Institutions. This paper tries to summarize earlier research works related to wetland conservation and the role of the institution in conservation and development of wetland. The paper also tries to understand its importance to provide sustainable livelihood opportunities to its local inhabitants. The pursuit of development often conceals the prevalence of degradation. A key role can be played by institutions to achieve the twin goal of development and conservation and could also initiate guaranteed sustainable livelihood. **Keywords:** Wetland, Institution, Conservation, Development, Sustainable Livelihood.

JEL: Q01, Q56, Q57

## 1. Introduction

etlands are considered to be a verv important and productive ecosystem as it provides numerous valuable services. Badsha (2017) considers wetlands as "the kidneys of the landscape" because of the functions they perform in wastes management from both natural and human sources. Wetlands offer social and ecological benefits by supporting biodiversity and play a critical role in regulation of natural cycles like hydrological cycle, carbon cycle, climate regulation (Prasad et al., 2002; Lavoie et al, 2016). They are considered the world's most biologically productive ecosystem which are rich in species diversity (Mombo et al., 2011; Badsha, 2017) and are important assets which need to be preserved for sustained use. Wetlands are a source of varied livelihood for the local communities (Kangalawe and Liwenga, 2005; Sagoe et al., 2021) like farming, fishing and aquaculture, travel and tourism especially ecotourism, livestock rearing,

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traditional wetland product-based livelihoods like medicinal plants, dyes, fruits, reeds and grasses etc. (Rebelo et al., 2010; Lamsal et. al., 2015; Cheng et al., 2020). But wetland degradation has become a great concern for the stakeholders all over the world. Prasad et al. (2002) observes that wetlands are one of the most threatened habitats of the world where more than half of the wetlands in the world are either lost, altered or degraded (Lamsal et al., 2015) basically due to anthropogenic factors (Prasad et al., 2002; Bassi et al., 2014). Even though wetland deterioration is a major problem worldwide. limited attention has been given to understand the processes that can improve or reduce deterioration of such natural resources (Ostrom, 2009). As a result the livelihood generating capacity of the wetlands has declined (Baruah, 2020) along with biodiversity loss.

Considering the important role of wetlands in the natural cycles such as the hydrological cycle, carbon cycle to name a few and on the other hand as a source of livelihood to the local people, discussions on conservation and protection of wetlands and livelihood generation often emphasize the role of policies (Bajracharya et al., 2006) and institutions (Roe, 2008; Lamsal et al., 2015; Posner et al., 2016; Badsha, 2017). Institutions as defined by Alaerts (1997) are "rules in any kind of social structure, i.e. the laws, regulations and their enforcement, agreements and procedures". Wetland degradation and loss is linked to poor institutional frameworks and a good framework should be sensitive to local needs (Marambanyika and Beckedahl, 2017). The wise use of wetland resources is very important so that livelihood can be generated without degradation. On this background, the paper tries to summarize various research works related to the importance of wetland so Role of Institutions in Conservation of Wetland Along with Maintaining Sustainable Livelihood to its Locals - A Review

as to understand the need for conservation, role and importance of institutions in preserving the wetland ecosystem. The paper also intends to see how institutions can harness sustainable livelihood to the wetland dwellers. To make a systematic presentation, the paper is divided into five sections. The second section highlights the nexus between the role of institutions in conservation of wetland and also on livelihood. Then in the third section, it briefly describes the methodology part where the section mainly deals with the data and methods used by most of the earlier researches related to this work. A general discussion based on the review of empirical works has been discussed in the fourth section and finally the fifth section winds up with concluding remarks about the studies and gap found in the literature from the research area which could help future researchers in this field.

## 2. Nexus between the role of institutions, wetland conservation and livelihood

According to North (1990), "Institutions are rules of the game in a society". Chuma et al., (2008) opined that Institutions are "social arrangements that shape and regulate human behaviour, have some degree of permanency and purpose, and transcend individual human lives and intentions". Institutions help in exchange of information on environmental issues, create awareness and can better understand the community preferences, which can further help in creating environmental (Chaikumbunga et al., policies 2019). Institution and organisation are sometimes used synonymously even though they are not equivalent. North (1990) clearly distinguishes between institutions and organizations as the rules and the players respectively. Institutions

are the rules of the game, while organizations are players in economic, political and social processes. Organisation are more formalised patterns of rules and decision making whereas institutions include underlying ideological values and norms (Young, 1989; Gupta et al., 2010).

The literature reveals the importance of all types of institutions, whether it be international. local or community level institutions. Levy et al. (1992) emphasize the importance of international institutions to preserve the quality of the planet for future generations with successful international cooperation so as to guide international behavior toward sustainable development. A truly effective international institution would improve the quality of the global environment. Not only international institutions but local or community level institutions also play an important role in the process of development. The need for community participation is globally recognized for the conservation and management of wetland resources (Williams 2002). Communities may start to self organise to create new institutions (Ostrom so as 1990) as Community institutions play a central role in supporting conservation (Hartanto et al., 2019). Nagendra and Ostrom (2014) state that public-community partnership models help to provide more inclusive, equitable as well as sustainable institutional alternatives. Badsha (2017) suggested a strong institutional framework wherein awareness building through training and workshop conducted for the local stakeholders should be the top priority. The institutional role in providing environmental education and ecological compensation can be a better solution to the problem between conservation and development (Cheng et al., 2020; Liu et al., 2020). Ntuli and Muchapondwa (2018) analysed the relationship between institutions and biodiversity outcomes in a community-based wildlife conservation and suggested that institutions can help in the management of common pool resources as institutions have a strong effect on biodiversity outcomes. The role of community based institutions in supporting conservation was studied by Bajracharya et al. (2006), Mwakubo and Obare (2009), Sakataka and Namisiko (2014) and Hartanto et al. (2019) and they found that community participation in ecotourism had led to improvement of livelihood as well as ecological protection. Mwakubo and Obare (2009) emphasize the effect of local institutions on the level and intensity of wetland utilization. Thus, wetlands are threatened by the increasing resource utilization, highlighting the need for institutional changes to ensure their long-term viability as aquatic ecosystems have the highest capacity to provide necessary regulatory, supporting, provisioning, and cultural ecosystem services (Sannigrahi et al., 2019). According to Virtanen (2002), sustainable management of natural resources is a process and not a static condition. Therefore, local institutions should create legislation and socio-economic conditions to support local management.

Protecting the environment and also serving the indigenous people are equally important as they have been residing and deriving benefits from nature for years. Involvement of local units to set rules and regulations, access to and use of resources, is becoming beneficial as the local environmental conditions can be better understood (Ostrom, 1995). Lamsal et al. (2015) find that when local households are involved in conservation, it leads to reduced extraction of resources which indicates better conservation programs by local institutions as well as provides sustainable livelihood to the communities who are dependent on wetlands

(Kangalawe and Liwenga, 2005). Despite the fact that wetland provides livelihood, opportunities still are being massively degraded (Kakuba and Kanyamurwa, 2021). Also comprehensive and authentic community participation in ecotourism can considerably improve livelihood and contribute to ecological protection. Veeman and Politylo (2003) talk about strengthening the institutions and making better policies for use and management of natural resources as it is important for the economic development as well as for alleviating poverty by improving the livelihood of the stakeholders. On the other hand, it is also true that strict rules in terms of accessibility in the protected areas might limit the development of the local people whereas there should be harmonious coexistence between humans and nature (Cheng et al., 2020). Thus the importance of co-management was felt. If institutions are strong and good governance prevails than co-management could be a better option for conservation. Co-management intends to involve local communities and provide sustainable benefits from the resources provided by the ecosystem while conserving the ecosystem (Ullah et al., 2022). Co-management as evidenced can be a productive solution for developing wetlands and along with the policies of conservation could also be effective for maintaining livelihood. Local people, when engaged in management and decision-making, benefit with regard to fulfilling their livelihood needs adequately, and therefore they are more likely to contribute to conservation (Bajracharya et al., 2006).

## 3. Data Source and Methods

Research papers were collected from preference by their actures sources like Google Scholar, ScienceDirect, Web of Science, Elsevier, ResearchGate. Out that are not traded in market.

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of 73 papers found, most relevant papers listed under the key terms like Wetland, Conservation, Institution, Livelihood etc. were extracted. Despite the high number of scientific papers on conservation, the role of institutions, livelihood patterns and change, a few review papers have been published in reputed journals and conferences. The scope of this paper includes articles dealing with the importance of wetlands, conservation of the protected areas, the role and significance of institutions in conservation as well as livelihood generation and co-management.

Initial basic information like ethnic and demographic characteristics, environmental awareness, conservation practices and participation, resource uses and income along with factors affecting wetland income are collected using Participatory Rural Appraisal (Kajembe et al., 2003; Kangalawe and Liwenga, 2005; Bajracharya et al., 2006) and Focus Group Discussions (Deresa and Legesse, 2015; Lamsal et al., 2015; Ward et al., 2018; Kakuba and Kanyamurwa, 2021). It also helps in finding the key respondents for an interview. A Key respondent interview (Lamsal et al., 2015; Marambanyika and Beckedahl, 2017; Kakuba and Kanyamurwa, 2021) helps to identify, analyse and report descriptively a phenomena like conservational practices and trend of land degradation (Deresa and Legesse, 2015). Apart from that, the Contingent valuation method (Ndebele and Forgie, 2017) is one of the common methods for estimating the economic values of ecosystem and environmental services, which is based on the Stated Preference Method where individuals are asked to state their preferences rather than revealing their preference by their actual purchasing choices and is used for goods and services

A spate of researchers have preferred the mixed method which uses both qualitative and quantitative analysis for environment related research (Kajembe et al., 2003; Kangalawe and Liwenga, 2005; Deresa and Legesse, 2015; Lamsal et al., 2015; Ward et al., 2018; Kakuba and Kanyamurwa, 2021). Quantitative analysis is basically done using correlation which states the degree and direction of the relationship between variables, t-test (Lamsal et al., 2015) which helps to determine if there is a significant difference between the means of two groups like comparing the wetland resource incomes to the household economies, Chi-square test (Marambanyika and Beckedahl, 2017; Ward et al., 2018) were used to find the nature of association between households and their knowledge on participating institutions or to test for a differences between groups. A similar association is found between the attitude for conservation and its related variables like:

Conservation attitude = f (Household Characters, Community factors, Institutional Characters, Idiosyncratic factors)

Where household characters include age, gender, nationality, education, household size, marital status and living arrangement of the household. Community factors include distance from the center. awareness. conservation practices and participation etc. Institutional characters include rules, regulation. leadership, accountability. transparency etc. Similarly, idiosyncratic factors are unique to individuals and locations which include beliefs, livelihood from nature and inherent dependence on the ecosystem.

It can be analysed using the econometrics method as Kakuba and Kanyamurwa (2021) used the linear regression model between planning for sustainable use (predictor) and sustainable livelihood opportunities for the Kinawataka wetland resource. Similarly, Deresa and Legesse (2015) used multiple linear regression to find the effect of anthropogenic factors on crop production. Ndebele and Forgie (2017) use logistic regression to check the factors affecting willingness to pay for specified changes in the quantity or quality of public goods and the effect of socioeconomic factors on wetland income can be determined using OLS (Lamsal et al., 2015; Ntuli and Muchapondwa, 2018).

## 4. Review of empirical works

## 4.1. Institutional arrangements for conservation

The success implementing of а government's policy basically depends on the institutional arrangement. Marambanyika and Beckedahl (2017) study the role, relationship and consequences of institutional arrangements towards wetland access using 123 households data in Zimbabwe and emphasized the formulation of an institutional structure which places local institutions at the core of the governance. Out of 123 households, 82.1% of households participated in wetland conservation like maintenance of fences (58.5%), monitoring of illegal activities (72.4%), conservation farming (54.5%), catchment protection (7.3%) etc. Kajembe et al. (2003) found that the presence of traditional institutions in the protection of the East Usambara forests in Tanzania i.e. traditional healers, traditional leaders, traditional taboos, sacred species and sites, had always played an active role in conserving the forest. On the other hand, Sakataka and Namisiko (2014) found that it is important to involve local people and beneficiaries to manage natural resources which will help in integrating the customary and traditional approaches into formal conservation strategies in Kenya.

Similarly, Lamsal et al. (2015) state that local institutions can promote sustainable management of resources as conservation activities when done by the local organizations and are more effective than externally designed and induced projects as they can solve conflicts and actively engage in the community participation. They recommended the introduction of the community forest management model, promotion of alternative livelihood strategies for the local people based on forest and lake resources and thirdly ecotourism development to diversify the economic opportunities and reduce their direct dependency on the lake resources. Similarly, various other research works propose a community-based conservation approach for better wetland resource use and conservation (Mehta and Heinen, 2001; Andrianandrasana et al. 2005; Bajracharya et al. 2006; Ward et al., 2018). Therefore in all this analysis, a need was felt to study co-management which can be defined as "a collaborative and participatory decision-making process of regulatory between representatives of user-groups, government agencies, research institutions, and other stakeholders. Power sharing and partnership are an essential part of this definition" (Jentoft, 2003). Co-management could be a better remedy to problems caused by other management arrangements (Pathmanandakumar, 2017). Ward et al. (2018) focus on the creation of more protected areas in Madagascar with a better co-management system after studying the impact of the comanagement process and how this impact is distributed to benefit the local livelihoods. In Madagascar, a new network of protected area was established, which is different from the existing state-run network like protected National Parks named as 'Durban Vision', which gives an example of co-management Role of Institutions in Conservation of Wetland Along with Maintaining Sustainable Livelihood to its Locals - A Review

by a 'promoter', usually an NGO and 'local community associations'. Similarly, Sagoe et al. (2021) emphasized that co-management results in effective conservation management policy as it combines formal scientific research with traditional knowledge derived from communities living within the ecosystem.

Against the positive results due to comanagement there is also evidence where co-management has failed (Ullah et al. 2022), as in the case of Teknaf Wildlife Sanctuary (TWS), which was among the first batch of Protected Area out of more than 20 Protected Areas to adopt co-management in Bangladesh. Data from 1989–2015 shows serious concerns over the effectiveness of the co-management system in conserving forests and indicates that the total area of forest cover has decreased. both before co-management (56%) and after co-management implementation (44%). Ironically inside the TWS, 30% of the forest area decreased before the implementation of co-management whereas 70% decreased after co-management implementation, but there was only 3% that decreased in the total forest area during the period outside the TWS. From all these discussions, a conclusion can be drawn that since the implementation of the co-management approach, loss of forest has slowed down in the region, but the comanagement approach was not able to stop deforestation inside TWS contrary to which deforestation has increased inside the TWS, indicating a failure to protect the remaining natural forests. But while deciding upon who should manage the protected areas, either an external authority or community based management, it is important that there should be a strong institutional framework. Agarwal (2000) analysed that even though community-level councils help in proper utilization and protection of resources, they

faced certain disadvantages such as lack of funds. As a result it is difficult to protect from unauthorized users and uses as they cannot afford the amount needed to hire guards. While for larger groups it becomes easier to properly enforce rules and monitor. Secondly, smaller groups find it difficult to prevent breaking rules or to impose sanctions on rule breakers and thus smaller councils are sometimes unsuccessful. Thus it is very important that government works should bridge the gap and monitor conservation as Abdulaziz et al. (2019) state that effective management of conservation areas depends on the capacity of the government. Along with government, conservation areas are managed by various agencies ranging from the national government, international organizations, nongovernmental organizations, communitybased organizations and local communities. But, Galinato and Chouinard (2018) examine how environmental policies implemented in neighboring countries influence environmental regulations of the other country to determine if strategic interaction exists when setting environmental policies at the country level using Spatial Durbin Model specification and found that neighboring environmental regulations do not play a significant role when countries implement their environmental regulations. However, government institutional quality has an effect on the environmental regulations implementation. Therefore it became very important to study how institutions can actively involve in conservation as well as the development of wetlands along with their capacity to generate sustainable livelihood.

## 4.2. Livelihood from wetland resources and the role of institution

Livelihood is the ability to obtain basic necessities of life such as food, water, shelter,

and clothing and all other necessities which are required for human survival (Kumar et al., 2019). Rebelo et al. (2010) state that in Sub-Saharan Africa, wetlands contribute in diverse ways to the livelihoods of millions of people basically through cropping and livestock management systems. Therefore, degradation to the ecosystem can have both direct and indirect bearing on the livelihood of the people. Sagoe et al. (2021) try to find the most relevant ecosystem services to livelihood and also pressures which threatened the supply of their prioritized ecosystem services using the ranking method. The study shows that food provisioning marked the topmost ecosystem service priority followed by nursery grounds for fish. On the other hand, pressures to ecosystem services include over fishing, deforestation, biodiversity destruction and water contamination by open defecation, fertilizer use, plastic, solid waste etc. Bajracharya et al. (2006) talk of local communities' initiatives in the Annapurna Conservation Area (ACA), Nepal and its benefits from conservation. Institutional initiatives provide better access to forest resources like fuel wood and fodder (89.5%), improved infrastructure as well as health, sanitation and social services (78%), support for agricultural development (66.7%) such as training in sustainable farming, access to vegetable seeds and seedlings, and technical help to establish a vegetable nursery. Major economic benefits due to such institutional structure to the locals were investments in the improvement of social services, agriculture livestock. increased employment and opportunities and access to training schemes. Kakuba and Kanyamurwa (2021) examine the impact of wetland management practices like planning, implementation and control on the Kinawataka wetland and its ability to provide

sustainable livelihood opportunities focusing on the gap between wetland management practices and the extent of sustainable harnessing of livelihood opportunities. They have used the triangulation method, which is a combination of different data collection methods to gather relevant information like a survey questionnaire, focus group discussions (FGDs), key interview and observation. The study finds a positive but insignificant relationship between the planning function and sustainable livelihood opportunities and a negative significant relationship between implementation and sustainable production. The study recommends inclusive management functions to achieve sustainable wetland livelihood opportunities.

The degradation of the natural environment can have a significant impact on the livelihood of the local inhabitants. Jiboye et al. (2019) study the impact of environmental degradation on livelihoods using the Chi square test and established that environmental degradation has a significant impact on major livelihoods. Similar to this study, Deresa and Legesse (2015) study the various causes of land degradation and how it impacts the livelihood of the people using the multiple linear regression model from the data collected through household survey questionnaires, field observations and key informant interviews and find that in order to improve the livelihoods of the farmers various off-farm activities were adopted in Toke Kutaye, Ethiopia in addition to farming like selling roots and fruits, farm animal and hand craft work, alcohol making, government employment and daily labor, and retailing of grain etc. Non-agricultural activities are critical to address some of the key problems of agricultural land scarce peasants and minimize natural resource degradation. Kangalawe and Liwenga (2005) study the livelihood of wetland dwellers in the Kilombero Valley, Tanzania and state that the major constraints for the wise use of African wetlands are poor the institutional framework and lack of knowledge of the benefits of the resources and techniques that can be used to utilize the resources in a sustainable manner.

A need was felt for a proper institutional framework so as to plan development efforts, poverty alleviation as well as wealth creation, to minimize conflicts over resource use and to prevent resource degradation in the wetlands. In order to develop a good institutional framework, Lockwood (2010) gives seven important principles associated with good governance outcomes. They are - legitimacy, transparency, accountability, inclusiveness, fairness, connectivity and resilience. Similarly, Ward et al. (2018) develop the Sustainable Livelihoods Framework considering livelihood assets, livelihood strategies, influence and access, transforming processes and structures and livelihood outcomes. The results show that with the establishment of protected areas, forest-based activities decreased, particularly collecting honey, cutting wood and gold-mining whereas agriculture and farming have increased, which implies that protected areas and co-management can be beneficial as rules can be made considering the local conditions, leading to greater stakeholder engagement and empowerment. Another method that could be effective for the management of protected areas is the Eco-compensation mechanism (Liu et al. 2020). China took the initiative of Ecocompensation for national parks funded by government where ticket income and part of franchising income are used for environment maintenance and community development affirming that institutions either international or local if working properly can effectively and

efficiently manage wetlands for sustainable development. Thus appropriate conservation strategies that are sensitive to local needs and that embrace local livelihood should be adopted for the wise use of wetlands.

## 5. Conclusion

Harmonious coexistence between humans and nature is the need of the hour. Therefore keeping in mind the enormous services wetlands provide, it is of utmost important to develop and conserve while maintaining the wetland in a natural state. Wetlands provide many productive and valuable services at population, ecosystem and global levels. Review of various literature proved that the real worth of wetlands and its services are ignored and underestimated because of which conversion or degradation of wetlands are taken to be normal and are therefore widely accepted around the world. Wetlands are found to be altered to agricultural fields. mining and constructing, construction of highway, commercial or residential spaces etc. Hence, in spite of the global concern and the spread of the wise use concept through the Ramsar convention, wetland degradation still continues all over the world. More importance should be given to institutional aspects like policies, rules and regulations for wetland management. Active participation by institutions, whether it be the governmental departments or local institutions, can bring positive changes in the minds of the people and can lead to protection and sustainable use of wetlands as well as maintenance of livelihood. The concept of alternative livelihood could be bought so as to save the wetlands from overuse and degradation but at the same time could provide a continuous source of income for those who are dependent on the wetland. A co-management system with the active Massachusetts, London

participation of local institutions helps in the formulation and implementation of policies that are tailor made to suit local needs along with the interest of conservation. A national level institutional framework can be formed to develop environmental laws and regulations which can provide policy guidance and technical back-up for wetland management. Even though various researchers have tried to highlight varied issues in the context of wetlands like the importance of the wetland, its conservation issues and the importance of the institution, very little empirical work has been done to find the impact of good institutions on the conservation of wetland along with preserving the livelihood of the indigenous population. Also limited works were found on how the institution can play an important role to channelize the resources so as to help the local inhabitants to earn a sustainable livelihood. More such studies by future researchers could help to bridge the gap between conservation and development so that both nature conservation and livelihood generation can go hand in hand.

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## Articles

## Appendix

Theme	Author, Year	Method Used	Focus Area/Findings
Conservation of wetlands	Ostrom (2009)	Social-Ecological Systems Framework	Loss of resources is of great concern worldwide but limited attention has been given for its preservation.
	Lamsal et al. (2015)	Focus Group Discussions, OLS	Involvement of local households in conservation can reduce extraction for sustainable use.
	Deresa and Legesse (2015)	Focus Group Discussions, multiple linear regression	Conservational practices, trend of land degradation because of anthropogenic factors
	Ndebele and Forgie (2017)	Contingent valuation method, logistic regression, WTP using OLS regression	Estimation of economic values of ecosystem and environmental services based on the stated preference method for non-market goods and services. Total Economic Value of the restoration and preservation programme of the Pekapeka Swamp.
	Ntuli and Muchapondwa (2018)	WTP using OLS	Effect of socioeconomic factors on wetland income
	Prasad et al. (2002) Bassi et al. (2014)	Literature Survey	Wetlands are the most threatened habitats especially because of anthropogenic factors.
	Baruah (2020)	SWOT Analysis	
Importance of Ecosystem Services	Badsha (2017)	Direct Market Pricing Method	Valuations of wetlands on the basis of direct and indirect uses. Wetlands are the kidneys of the landscape as they perform an important function of waste management.
	Prasad et al. (2002),	Literature Survey	Wetlands provide social, ecological benefits along with supporting biodiversity.
	Lavoie et al. (2016)	Multi-criteria analysis, Integrity index	Assessment of the ecological value of wetland complexes so as compare them and identify priorities for protection
Wetland and Livelihood	Rebelo et al. (2010)	Qualitative analysis- Focus Group Discussions, Household survey	Wetlands contribute through varied ways of livelihood. Socio-economic constraints prohibit development like lack of markets, high labour
	Roe (2008)	Literature Review	requirements etc.
	Sagoe et al. (2021)	Qualitative analysis- Focus Group Discussions and participatory mapping	Analyses the most relevant ecosystem services to livelihood

Theme	Author, Year	Method Used	Focus Area/Findings
Importance of Institution	Lamsal et al. (2015)	Focus Group Discussions	Importance of institutions in conservation and development as well as livelihood
	Badsha (2017)	Descriptive Statistics	generation.
	Ntuli and Muchapondwa (2018)	Regression Analysis	Institutions affect cooperation and influence the success of biodiversity outcomes through cooperation. Without restrictions in governance of human behaviour, resources will be vulnerable to overexploitation
	Posner et al. (2016)	Principal components analysis, ANOVA	For institutions to achieve conservation and development, ecosystem knowledge is essential as it influences policies and decisions.
	Kajembe et al. (2003)	Participatory Rural Appraisal, Regression	For sustainable conservation various strategies must be combined, including the use of traditional institutions, analysis of socio-economic factors should be taken into account for improving local management practices.
	Hartanto et al. (2019)	Qualitative research and assessment of literature Descriptive Analysis	Community institutions help in supporting conservation. Integration of related institutional supports preservation like community empowerment programs, tourism development etc.
Institutional strategies for wetland management	Sannigrahi et al. (2019), Virtanen (2002)	Land Use Land Cover Change, Correlation	Institutional changes are to be made to sustain the ecosystems.
	Veeman and Politylo (2003)	Descriptive analysis Evaluation of economic performance which include 'green' output and productivity measures, sustainability rules or criteria using Stakeholder Analysis	Evaluating the institutions, economic performance so that it can lead to economic development and alleviation of poverty by improving the livelihood of the stakeholders
	Marambanyika and Beckedahl (2017)	Chi-square test	Good Institutional framework should be sensitive to local needs.
	Cheng et al. (2020), Liu et al. (2020)	Literature Survey	Provision of environmental education and ecological compensation to solve the problem between conservation and development

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## Articles

Theme	Author, Year	Method Used	Focus Area/Findings
Co-management or Community-based management	Mehta and Heinen, 2001, Bajracharya et al. 2006; Ward et al., 2018)	Social survey, Participatory research, Chi-square test	Community-based conservation is better for wetland resource use as well as conservation.
	Bajracharya et al. (2006)	Participatory Rural Appraisal	Community participation is globally recognized for conservation and management of wetland resources
	Mwakubo and Obare (2009)	CVM, Tobit model	
	Sakataka and Namisiko (2014) Sagoe et al. (2021)	Qualitative analysis- Cross-cultural Survey	Involvement of local people help integrate customary/traditional approaches and formal conservation strategies
	Nagendra and Ostrom (2014)	Social-ecological System Framework	Public-community partnership can provide equitable and sustainable institutional alternatives
	Cheng et al. (2020)	Literature Survey	Sometimes strict rules in protected areas limit the development of the locals, therefore Co-management could lead to harmonious coexistence between human and nature.
Co-management and Livelihood	Kangalawe and Liwenga (2005)	Participatory Rural Appraisal	Wetlands provide livelihood to local communities.
	Sagoe et al. (2021)	Descriptive Statistics Analysis	
	Bajracharya et al. (2006)	Participatory Rural Appraisal	Community participation leads to improvement of livelihood like livestock rearing, wetland based products, ecotourism etc.
	Mwakubo and Obare (2009)	CVM, Multinomial Logit model	
	Rebelo et al. (2010)	Qualitative analysis- Focus Group Discussions, Household survey	
	Sakataka and Namisiko (2014)	Focus Group Discussions and Community Vulnerability Assessments	
	Lamsal et. al. (2015)	Focus Group Discussions, Quantitative analysis using correlation, t-test.	
	Cheng et al. (2020)	Literature Survey	

Theme	Author, Year	Method Used	Focus Area/Findings
	Ullah et al. (2022)	Land cover change by remote sensing, Comparative analysis using time-series data.	Co-management initiatives can conserve biodiversity while providing support to local Communities. Without proper institutional framework co-management structure may fail as in the study area 64% of forest loss took place even after Co-management implementation.
	Ward et al. (2018)	Sustainable Livelihoods Framework	Protected areas co-management may have both positive and negative impacts, If impacts are unequally distributed within local communities, people perceived negative livelihood outcomes.