Swedish University of Agricultural Sciences
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Matching Socioeconomic and Ecological need in Wetland Management using Systems Approach: *The case of Cheffa wetland in Ethiopia*

Seifu Bekele

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Abstract

The world is facing increasing and interrelated water problems. The water is not only scarce but also not properly developed, managed and utilized. Wetlands are vital resources, which significantly contribute to the water system, as they have multiple functions and values. But they are complex ecosystems and are one of those misused or over exploited resources because of different reasons. That includes lack of understanding of its value and function, inadequate legislation and lack of relevant information and limited involvement of stakeholders, especially the local people, in decision making. It is due to poor management practices, which lack acceptable standards, in water and related resources management.

Although Awash River is the most developed river basin in Ethiopia somewhat with better infrastructure, the issue of population growth, increasing demands for resources, agricultural expansion, and environmental situation of the region and wetlands degradation is serious concerns to maintain the function and value of the basin.

This paper focuses on how wetlands in can be managed properly to address the two most significant needs which are socioeconomic and ecological needs. In most cases including Cheffa Wetland, one of the wetlands of Awash River basin in Ethiopia, the interrelated environmental, institutional, social and political factors influence the management practices. These factors along with the nature of the wetland make the issue of management complex. So as to deal with such a complex situation, a holistic and integrated approach is required instead of fragmented and sectoral attempts to manage the resource. System thinking is a holistic approach that provides an alternative to understand the problematic situation and allows all stakeholders to participate in improving the situation through understanding deferent perspectives. Therefore in this paper Systems analysis is used as a methodological framework, to deal with the problematic situation of Cheffa wetland. Integrated water resource and adaptive management as the two sets of concepts are used in contemporary water resource management practices to address the complexity and uncertainty in resource management decision are considered in this thesis.

Keywords: Wetlands, SSM, Cheffa flood plain, Wetlands *of Ethiopia, AM and IWRM*

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Abbreviations and Acronyms

CATWOE: Refers To Customers, Actors, Worldview, Owners and Environment

DF:-Development Fund

EPA: - Environmental Protection Authority

EWNRA: - Ethio-Wetland and Natural Resource Associations

FDRE: - Federal Democratic Republic Of Ethiopia

GWP: - Global Water Partnership

GWP-TAC – Global Water Partnership Technical Advisory Committee

HAS: - Human Activity System

IWA: - International Water Association

IWRM:-Integrated Water Resource Management

MoARD: - Ministry Of Agriculture and Rural Development

MoWR: Ministry Of Water Resources

NGO: - Non-Government Organizations

ORDA: - Organization for Rehabilitation and Development in Amhara

PFE: - Pastoralist Forum Ethiopia

PRA:-Participatory Rural Appraisal

SDI: Systemic Development Institute

SPNN: - Southern People Nations and Nationalities

SSM: - Soft Systems Methodology

TWOCAGES: see CATWO

UNEP: - United Nations Environment Program

UNSCO: United Nations Social and Cultural Committee

UNWVC: - United Nations Water Virtual Center

WRMP:-Water Resources Management Policy

WV: - World Vision

WWAP: - World Water Assessment Program

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Chapter One

Introduction

Wetlands play a prominent role in hydrological system, environmental and socioeconomic activities. Studies show that wetlands cover 6-8.6 % of earth's land surface, which is about 12.8 million square kilometer (Ramsar, 2004; Finalyson and Davidson, 2009; EWNRA, 2008).

The Ramsar convention defined wetlands as

> *'Area of marsh, fen, peat land, or water whether natural or artificial, permanent or temporary, with a water that in a static or flowing fresh or brackish or salt including area of marine water depth of which at low tide doesn't exceed six meter.'*(Ramsar convention secretariat, 2006).

Ethiopia has a variety of wetlands different in characteristics which covers 2% of its land area (EWNRA, 2008). Developing and utilizing these vital resources by taking socioeconomic and ecological needs into consideration could be the best practice. But there is a challenge to achieve the goal of society's need and addressing ecosystem issues. Ethiopia, like all developing countries, depends mainly on natural resources for its development whereas protecting the environment for future generations is also a challenge in this development process. It is inevitable that wetland management is a critical area of concern for all users whose livelihood is dependent on this resource.

1.1 Problem statement

For many years, the world has been confronted with increasing and interrelated water problems. It remains the same not only because water is scarce, but also not properly developed, managed and utilized. The problem may vary between countries depending on various factors, such as geographical, demographic and level of development (Gourbesville, 2008). In the developing countries, such as Ethiopia, the situation of the water resources is critical as institutional capacity, policy and governance required to be compatible with society's demand and long term water resource development[1].

[1] *Tesfaye Tafese 'A Review of Ethiopia's water sector policy, strategy and program' in Taye A. (edt.). Digest of Ethiopia's national policies, strategies and programs*.(Addis Ababa, Forum for Social Studies,2009)

Wetlands are crucial elements of the hydrological cycle and significantly contribute to the water system. As Yilma (2003) pointed out, they are the main custodians of valuable water resources.

Since the 1971's Ramsar convention, the issue of wetlands has dominated the discussions. But many people failed to notice that wetlands all over the world have been providing multiple goods and services to different users and are under threat (Schuyt, 2005). Several people assume that wetlands are common recourse to exploit and abundant thereby anyone is entitled to use them (*Ibid*). However, a lot of people have not observed wetlands are either drained or lost and need proper management. Studies show that 50% of the world's wetlands have been disappeared in the past century (Gourbesville, 2008).

For instance, Awash is the most important river basin in Ethiopia due to the reasons that it is not Trans- boundary and relatively most 'developed' or utilized river basin in the country (MoWR, 2002, Kefyalew, 2003). The population increase in the region, increasing demands, environmental situation of the region (desertification), and wetlands degradation are some of the challenges that the basin is facing[2]. The ministry of water resources has reported that the basin has reached its highest level of development and emphasizes the need to carry out further studies (MoWR, 2002). According to the study report from Pastoralist Forum Ethiopia (PFE), Awash River valley is under pressure due to development activities such as sugar plantation, commercial cotton plantation and other commercial framing, and an increase in population (PFE, 2005). At first glance, it looks as the benefits from the resources have been received, and the objective of development is achieved. However, this competition for natural resources not only creates tensions and conflicts between the users, but also directly related to the shrinkage of grazing land, and availability of water sources[3]. On the other side, some wetlands of Awash River valley are being drained for crop production and in some areas the livestock displaced from land converted to large scale agricultural development are grazing the wetland (EWNRA, 2008).

If it remains like this it is possible to lose some of the wetlands in the basin, and probably there will be a decline in socioeconomic benefits and the environmental services, as well. Therefore, a management approach that all stakeholders can participate in decision making and provide the chance to get a common or shared objective is needed. In order to stabilize competition for

[2] http://www.iwmi.cgiar.org/assessment/files/pdf/publications/WorkingPapers/WaterofAwasBasin.pdf
[3] *Indigenous systems of conflict resolution in Oromia, Ethiopia , Desalegne et.al ,2005,*

resources among multiple users through coordinated and integrative efforts. By rethinking the sectoral and fragmented approach, it is quite possible to improving the situation through adopting a holistic and integrated approach such as IWRM and Adaptive Management.

Research question

Wetlands provide different goods and services for different users with different functions and values. That includes social, economic and environmental functions[4]. As a result of this, there is competition for wetland resources. Population and demands for resources are increasing, and people are competing for resources. Meanwhile, it is necessary to have the functional wetland ecosystem to meet both current and future needs. This paper, hence, attempts to find out the way to balance these needs by answering the following questions.

1- How can competition for wetland resources for social and economic needs be met while maintaining the Ecosystem?
2- How the management practices in the existing management systems has developed?
3- What are the obstacles to adopt wetland Management system that includes social, cultural and Ecological needs?

1.2 Objectives

The Main purpose of this Thesis is:-

1- To explore, assess and critically discuss and analyze the existing wetland management practices in Ethiopia, Particularly in Cheffa wetland.
2- To find out how wetlands can be managed systemically for multiple purposes and users in order to achieve socioeconomic benefits without compromising the ecosystem.

With the following sub-objectives: -

A- To use The Ramsar Convention of 1971 on Wise use of wetlands and national policies on use and development of such resources and IWRM framework to identify the criteria for management practices and

[4] *http://www.ramsar.org/pdf/lib/lib_manual2006e.pdf*

B- To apply Systems approach and soft systems methodology, in the attempt to find the most efficient systems that includes all users and uses of the wetland.

1.3 Significance of the study

The Relevance of this problem to work with is that it provides knowledge about wetland management practices and the application of IWRM by taking the following reasons into consideration.

1- In view of the fact that wetlands have a direct effect on hydrological cycle, rainfall pattern, and availability of water, it is necessary to adapt proper management approaches in order to gain most out of these resources.
2- According to report from Ethiopian wetland and natural resources association, 'wetlands los aggravate climatic disturbance by increasing carbon build up into the atmosphere' (EWNR, 2008).
3- Pastoralists, Who are nomadic and they move following the presence of water and grazing land, as well as farmers need right to access to the Natural resources(Kefyalew,2003).

Therefore, information that has been collected from secondary sources is not enough to describe the entire situation. Hence, it is necessary to know the facts that how the local people who are historically has been using the resources of Cheffa wetland perceived the situation, what they think is the problem, what actions that have been taken to improve the situation (local knowledge) and what they wanted to change. It is also necessary to know the capacity and activities of stakeholders involved.

1.4 Study area

Awash River valley in Ethiopia is the project site. It is the most and highly Developed River basin in Ethiopia with improved economic infrastructure (Kefyalew, 2003) and the only non trans-boundary River basin in Ethiopia. The water resource policy of Ethiopia emphasizes the application of Integrated Water Resources Management (IWRM) as an approaches and development of the water in sustainable basis (MoWR, 1999; Taye, 2009). The water policies emphasize '*Enhancing the Integrated and Comprehensive Management of water resources, which avoids fragmented approach*' (MoWR, 1999). However, the existence of overlapped responsibility of some of the actors in natural resources management, lack of public participation

and the sectoral development projects which contradict with IWRM principles and sustainable management approach which is underlined in the country's water resources policy of 1999. The water resource policy gives little attention to wetland apart from mentioning its socioeconomic and hydrological importance and defining wetlands as defined in Ramsar convention, which is not yet signed by Ethiopia.

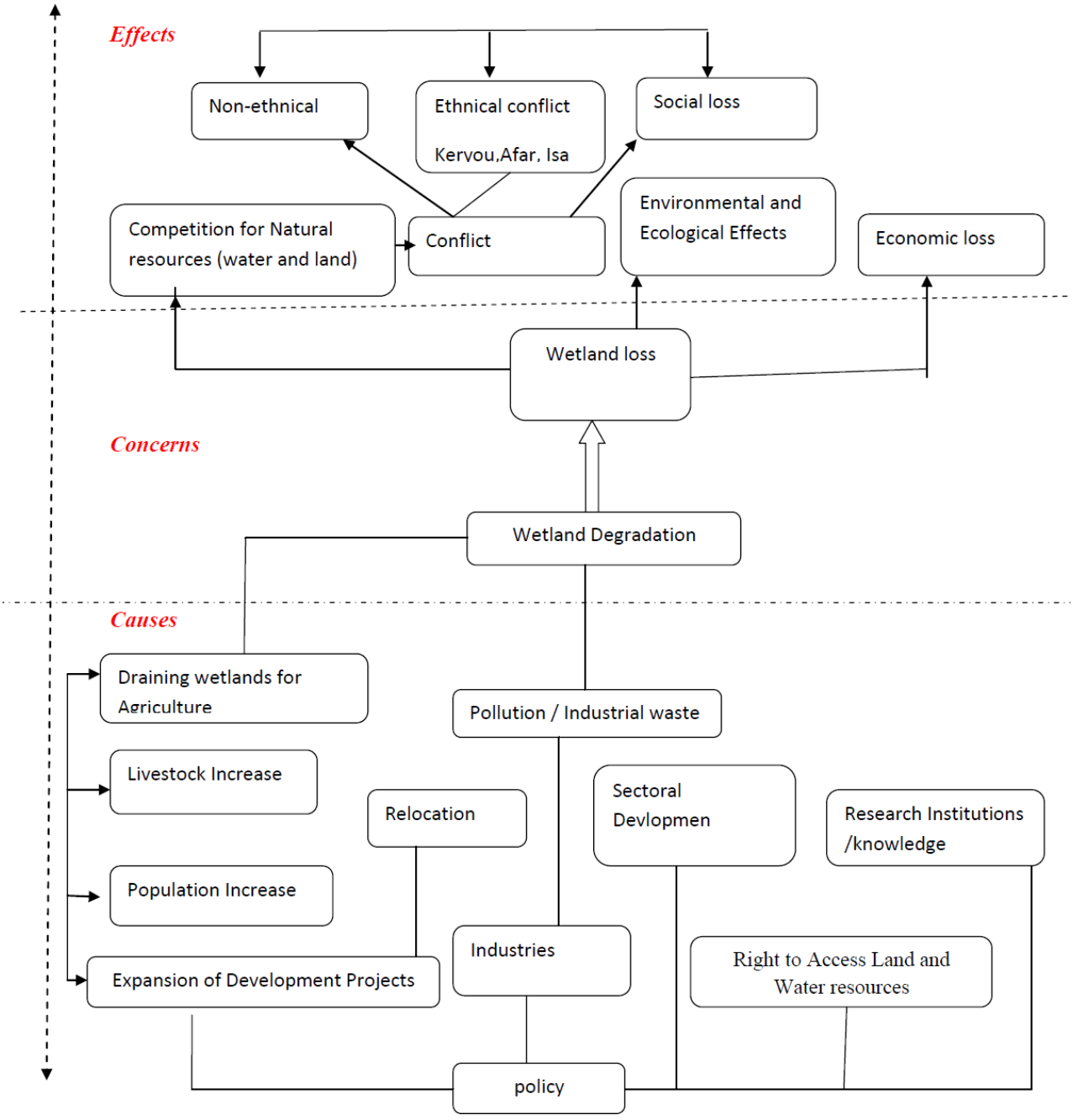
1.5 Topics to work with

Wetland management is one of the issues that have been raised from the description of the problematic situation, and I would like to work with this issues. According to studies 70-73% of country's large scale irrigated agriculture is found in this River basin (Kefyalew, 2003, MoWR, 2002). In addition, the decisions on expansion of development projects in this region are 'top-down' approaches, which is manly focus on investment, and the involvement of the local people is limited (Desalegne et.al,2005). The water sector development program of the country also identifies that one of the impacts of development projects is wetland los (MoWR, 2002). Moreover, this expansion also creates tension between the owners of the project and the local people. As a result, they are forced to look for another alternative water source and grazing land. The other thing is inter-ethnical conflicts are caused by competition for natural resources particularly land and water. This is mainly due to allocation of water and land rights (Desalegne et.al, 2005).

1.6 Problem delimitation

In the Cheffa wetland, in the Awash Rives basin, the factors that contribute to conflicts are not only limited to competition for land and water resources or relocation due to development projects. Some aspects such as traditional and cultural value differences among the local people who shared this wetland system also have an impact on how the conflict has been emerged. However, it is difficult to cover that due to time and financial constraints, even though it has a potential to contribute in building trust among the local people in order to have a common goal of managing and utilizing the wetlands. The other point that may be left out, but would have been interesting to have it in the study is the possible experiences of areas that may not be taken as a sample. Since wetland covers a total of 82,000 (ha), it is difficult to cover the whole area

Figure 1- Problem tree for Wetlands of Awash River Basin



1.7 Structure of the study

This paper has divided into three parts and seven chapters. The first part of the paper has abstract, table of content and acknowledgments. The second part is the main part which the main body of the paper and finally there is a part for Annexes. The first chapter, which is about the introduction and background, briefly describe historical and back ground information and introduction of the general area of concerns to be studied in the following chapters. Chapter 2 is used to discuss the theoretical foundations and literatures used in the study. The third Chapter is all about the Methods, tools and methodology of the study. The next chapter, chapter 4, briefly describes the overall pictures of the situation in the case study area. The next two chapters, Chapter 5 and 6 are assigned for findings and methodology inaction and discussion of the findings respectively. The final chapter, 7, will be used for recommendation, conclusions and few paragraphs of reflection.

Chapter Two

Theoretical considerations

2. Water resource management approaches

Climate change, ecosystem degradation, food crisis and most importantly poverty are the causes that add some dimension to the already existing water problems. Ground water depletion, ever increasing population, increased water need in industries, intensified agricultural activities, as well as a decline in water quality have been the sources of water and related resources[5].

In contemporary water resources management approaches, unlike the previous time when decision are made through a process that only considers limited aspects, such as demand, must have the capacity to look all dimensions of resources management(Al Radif 1999). The two predominant water management Theories, Adaptive Management and IWRM, will be discussed in this paper.

2.1. Adaptive Management

Over the years, natural resource management assumed factors such as economic, social and environmental are predictable. But the future is full of uncertainty, and it is necessary to consider the variability of those factors in resource managements (Pahl-Wostl et al., 2005). In addition, ecosystems are complex systems and any changes in the system will affect the function of the whole system. Over recent years the water management decisions have shown the tendency to use the approaches that involve different users at different levels by taking the Political concerns, historical facts, as well as analysis of this information into consideration (Medema et al., 2008). But the complexity of the ecosystem that has interconnected problems and uncertainties in the environment would cause unpredictable output. It is difficult to adopt or design specific management approach for every water related problems. This is also because of the need to understand the whole ecological system to make decisions on the use and development of resources (Pahl-Wostl et al. 2005).

In order to have effective resources management under the conditions of uncertainty, people are not only need knowledge, but they also have to learn how to change their behavior in response to new knowledge (McLain and Lee, 1996).

[5] *World Water Assessment Program 'The United Nations World Water Development Report 3: Water in a Changing World. (Paris: UNESCO, and London: Earthscan,. 2009).*

Therefore, it is inevitable to have an appropriate management approaches that can be used in such kinds of complex situations and uncertainties. Adaptive management has been popular for the last few decades since its emergence in 1970's (Johanson, 1999; Jame et al. 2010).

The theory of adaptive management in natural resources takes some of the ideas of adaptive control process theory. A theory which designs 'decision-making' or 'control' devices that have a mechanism to get feedback which allows accumulation and exploration of information enable to learn from the experiences (McLain and Lee, 1996).

According to Holling (1978), sited on Pahl-Wostl et al. (2005), adaptive management is *"a systematic approach to improve management and accommodating change by learning from the outcomes of management policies and practices."* In some literatures, it was quite elaborated and defined as *'a systematic process for improving management policies and practices by systemic learning from the outcomes of implemented management strategies and by taking into account changes in external factors in a pro-active manner* (Pahl-Wostl et al. 2010).

Holling also argue that, adaptive management has responsive characteristics. This is because ecosystems are complex systems that are self organizing, and any management system should be able to readjust itself to changes in the system[6]. Unlike other approaches, adaptive management gives attention to 'flexibility' and 'adaptive' potential of the system. By flexibility, it means a possibility of structural change in the system, where as adaptability is responsiveness of a system towards changes in 'external boundary' conditions[7]. There is deferent understanding of Adaptive management. Some argue that the approach can work under all conditions, even in the absence of sound scientific bases. But the likes of smith, Walters and Halbert, believe significant investment is required in the areas of research, monitoring and modeling to find an option in management of natural resources[8].

[6] *Pahl-Wostl et.al 'IWRM and Adaptive Management: Synergy or Conflict? (2005).*
[7] *Ibid*
[8] *Ibid*

2.2. Integrated Water Resource Management (IWRM) Theory, Principles and Challenges

Over the years, water resource has been managed in a way that maximizes the quantity available for users of the resource. Scholars in the field argue that, this approach is more of 'supply driven' than the modern approach which considers demands (Pahl-Wostl et al., 2005). However, the shift in paradigm in the late 90s and 80s shows a tendency of looking for a holistic approach to water management. This is to have water resource management that considers both human and ecosystem requirements and understand the interaction between these two. As a result, Integrated water resources management (IWRM) approach is emerged during 90s (Pahl-Wostl et al., 2005; Brega, 2001; Wallace et al., 2003). According the document from United Nations water virtual center (WVLC)[9], IWRM is far better than the traditional management approach in balancing the demand and supply. It focuses on integration of environmental and cross sectoral human interests.

IWRM considers the demands derived from Economic, Environmental, social and cultural needs and the technical ability to satisfy those needs without compromising future interests (Engle et al., 2011). It is also noted that, especially after the 1992's Dublin conference, IWRM is considered as a sustainable way of managing resources. According to Pahl-Wostl et al., (2005), IWRM is '*a sustainable means to incorporate the multiple competing and conflicting uses of resources'*. Many countries have been adopting this framework in national policies since then. IWRM promotes the integration of sectors, sub sectors and fragmented polices in order to adopt a demand driven approach to meet different interests from different users (Al Radif 1999).

What is IWRM?

There are different definitions of IWRM. However, Global Water Partnership (GWP) definition is used by most scholars.

[9] http://ocw.unu.edu/international-network-on-water-environment-and-health/introduction-to-iwrm/modules/lesson1.pdf

The GWP-TAC defines IWRM as follows;

> " *a process which promotes the coordinated development and Management of Water, land and related resources, in order to maximize the resultant Economic and Social welfare in an equitable manner without compromising the sustainability of vital ecosystem(GW-TAC,2000)."*

IWRM approach and its implementations have some fundamental elements which also used to describe the whole process. These are Enabling environments which refers to the required policies, legislations, strategies; Institutional setups that are necessary for implementation, and Management Instruments which is setting up the required management instruments to implement the policies and legislations (GWP-TAC, 2004).

IWRM is a holistic approach in essence that the whole system has to be taken into account when the dynamic relationship between environmental and human needs to be considered (Pahl-Wostl et al., 2005).

Basic elements in the concept of IWRM

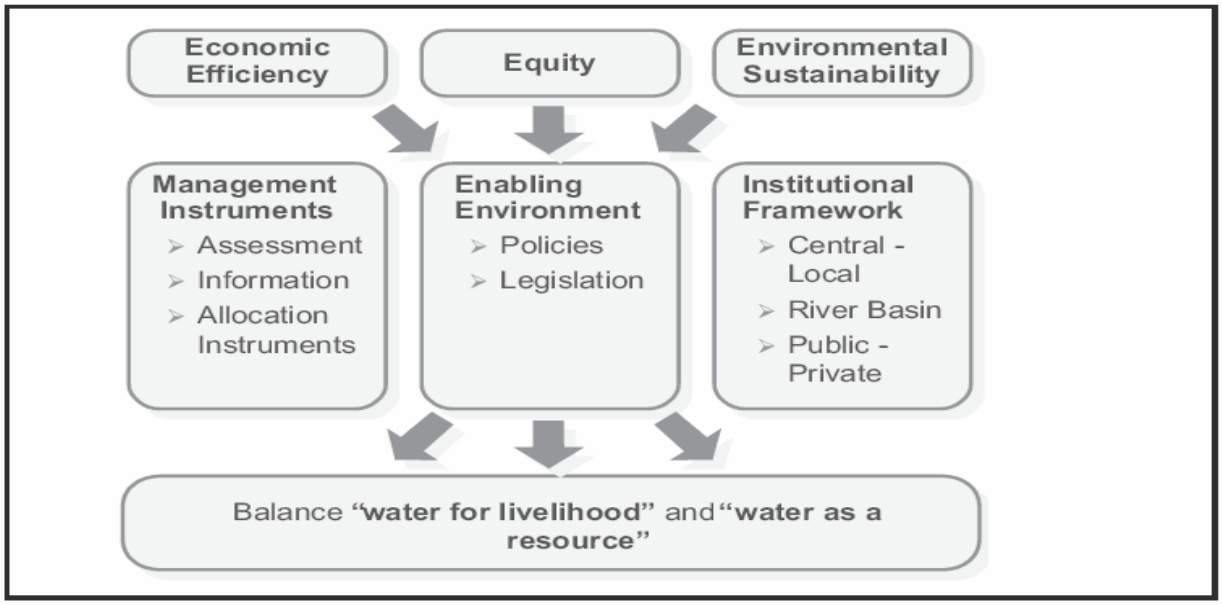


Figure 2.1-: Source: Pahl-Wostl et al. (2005); GWP-TAC (2004).

2.2.1 Principles of IWRM

The 1992 Dublin conference set some basic principles and guidelines for the management use and development of water resources. These principles are raised on an international conference on water and Environment. The principles are formulated through international consultative process. It consists of the following four basic IWRM principles (GWP-TAC, 2005).

1- Water is a finite and vulnerable resource essential to sustain life , development and Environment
2- Water development and management should be based on a participatory approach involving users, planners, and policy makers at all levels.
3- Women play a central part in the provision, management and safeguarding of water.
4- Water has an Economic value

The first principle is about the need to have management practices that recognize the hydrological characteristics of the water resource and its relationship with and interaction among other natural resources. This is to maintain multiple use and users of water, and its management should adopt a holistic approach. The term that refers water as a 'finite' resource is used to describe the availability of water in particular time as a result of hydrological cycle[10].

The second principle underlines the importance stakeholder participation in use, development and management of water resources. It seems that everyone in this planet can't leave without water, but stakeholders are those who claim their interest or a right as far as water is concerned. Participation means all such as, Local community, government and non government organizations all have to have an active role in decision making process. The third principle focuses on 'gender' issue that has been reflected not only in water managements but also in other resources management. The main focus is to involve women in decision making process of water use, allocation and development[11].

Despite their significant role in a 'collection' and 'safeguarding' of water, women are marginalized in decision making process. Of course, this level of involvement of women in water related

[10] *GWP-TAC background papers no. 4,(2005)*
[11] *Ibid*

decision making process varies depending on the Economic, cultural and social status of societies. IWRM, however, put emphasis on the need to participate women at all levels[12].

Finally, the fourth principle is about considering the economic value of water. Unlike other resources, there is apperception that water is free good .However in IWRM water has an economic value and in order for users to extract the ultimate benefits as well as sustain the resource for future use[13].

2.2.2 Other principles of IWRM

International Water Association (IWA) and United Nations Environment Program (UNEP) describe principles of IWRM in more specific terms. These principles have all ideas behind the Dublin principles but they have more self explanatory elements on the list.

According to IWA and UNEP (2002), the principles of IWRM are:

1- IWRM should be applied at catchment level.
2- It is critical to integrate water and environmental management
3- Full participation by all stakeholders including workers and community.
4- Attention to social dimension
5- Capacity building
6- Availability of information and the capacity to use it anticipate developments
7- Full cost pricing complemented by targeted subsidies
8- Central government support through creation and maintenance of an enabling environment
9- Adoption of the best existing technologies and practices
10- Reliable and sustained financing
11- Equitable allocation of water resources
12- Recognition of water as an economic good
13- Strengthening the role of women in water management

As the name indicates, IWRM is designed to manage the resource for different sectors and users. These principles are outlined and describe in a way that shows how the approach has to offer to

[12] *GWP-TAC background papers no. 4,(2005)*

[13] *Ibid*

solve the complex water related problems. However in practice there are several challenges and uncertainties.

2.2.3 Challenges of IWRM

Since the introduction of the approach three decades ago, international conferences and meetings have been conducted in raising awareness and to promote the IWRM as an effective way of managing water resources. But there are concerns when it comes to implementation. Similar to most theoretical approaches the main challenge for IWRM is the gap between the principles and the implementation (Rahaman and Varis, 2005). The challenge such as considering 'water as an economic good' is far more complex in practice than in theory as it has political, economical and social issues. Therefore, there are challenges of political, social and economic in implementing the agreed principles of IWRM.

Dimension of IWRM;

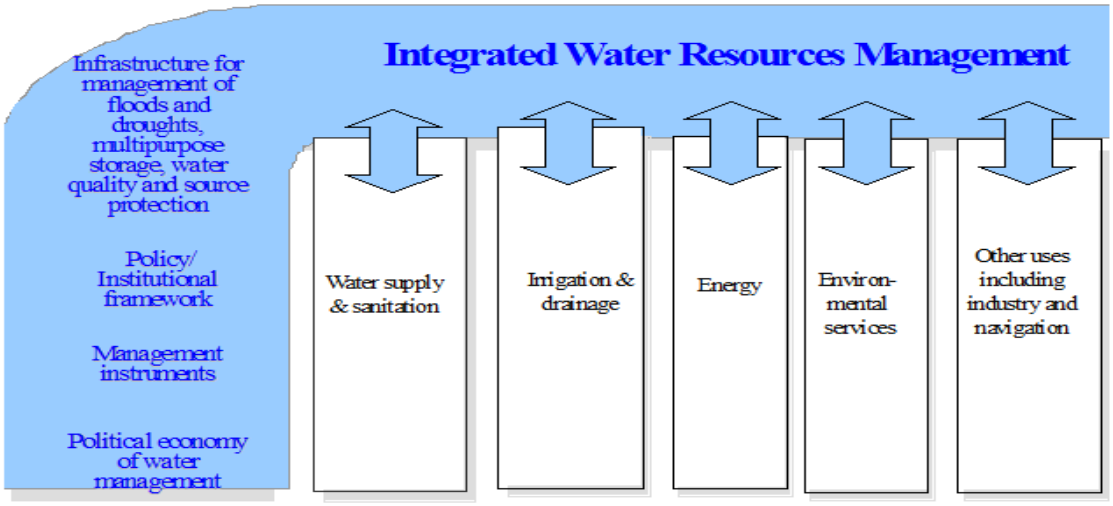


Figure 2.2- Source: WWAP, UNSCO.ORG

2.3. Water governance

Water resource management is not a responsibility of a single body and it not only delivering water services to users. It needs the attention and involvement of policy makers, experts, Political and social administrative bodies, as well as the required legislatures, strategies, policies and institutions to allocate, use and develop the water resources in a given area. It is not only about

state actors, but includes also non-state actors such as NGOs, and civil society (Jonathan et al. 2011).

GWP defines water governance as:

> *"[T]he range of political, social, economic and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society*" (Jonathan et al.,2011,GWP, 2002).

Despite the fact that there is no clear definition of water governance and the confusion of the term governance with government, the above GWP's definition has the elements of behind the concept Governance.

Governance is a broad and complex issue that can be addressed separately. But in this paper it is used to describe how responsibility is perceived among resource users and how it should be addressed.

2.4. Social learning and Learning cycles

2.4.1. Social learning

Shifting the idea of traditional management of resources into more coordinated and integrated way requires common ground to learn individually and in group. The expert's knowledge and the users, local knowledge, should be brought to the table in dealing with resources related problem to gain new ideas, information and new skills. As Mostert (2007) pointed out, Social learning refers to this perception new idea of 'learning together' and 'manage together'.

Social learning is a "dialogue-based processes through which different stakeholders try to achieve an inclusive, systemic and shared understanding of a given set of issues and how to manage them" (Mostert 2007). Mostert further argues that this approach has some basic features by underlining the importance recognition of inter dependencies, interaction among all stakeholders, as well as the need of joint decision making mechanism. For Blackmore (2007), the most important things in social learning process are a) convergence desires or goals and knowledge, build the mutual respect and trust among stakeholders b) co-creation of knowledge through interaction and c) Change in behavior towards issues as a result of shared actions.

2.4.2. Learning cycle

Learning is a cyclic process in which helps to gain knowledge and experience. One can learn in different ways and there are several learning theories with different philosophy to explain the learning process (Blackmore 2007). Cognitive learning, Behavioral learning, and Experiential learning are some of the learning theories (Kolb et al., 2001). Cognitive learning theory highlights the importance of cognition over effect, where as Behavioral learning theory has no room for experience. Unlike the other two, Experiential learning is emphasizes the significance of experience in learning process (Kolb et al., 2001).

David Kolbe is one of the advocates of the experiential theory. He developed a learning model to explain a cyclic learning process which has four different stages. These four stages are Concrete Experience (CE), Abstract Conceptualization (AC), Reflective Observation (RO) and Active Experimentation (AE) (Kolb et al., 2001).

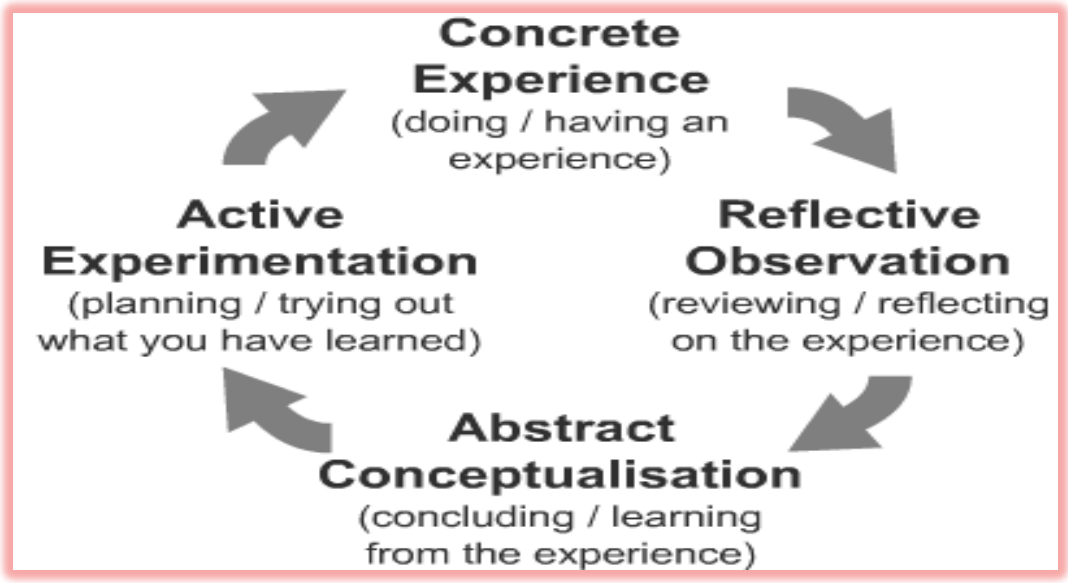


Figure 2.3- Kolb learning cycle[14]

2.5. Wetland Ecology and Function

Wetlands always have a role to play and are parts of human life. They have been parts of civilization and support the social needs and help to maintain environmental balance. There are different definitions to describe these wetland functions and values. For instance according to

[14] *Kolb 'The Experiential Leaning Cycle and Basic Learning Styles' (1984).*

Keddy(2000), wetlands are defined as "*an ecosystem that arises when inundation by water produces soils dominated by anaerobic process and forces the biota , particularly rooted plants to exhibit adaptations to tolerate flooding*." This is a complex way of defining wetlands by considering the complex structure of wetland ecology as well as features of wetland.

The difficulties in definition of wetlands are due to nature of wetlands since they have both aquatic and terrestrial properties, though it is nether purely neither aquatic nor terrestrial (Keddy, 2000; (Finlayson and Valk 1995). The Ramsar Convention definition of wetlands uses relatively clear and broad approach. According to the convention (Article 1.1) wetlands are defined as:

> *"areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters*"(Ramsar,2006).

Although wetlands described primarily as water, there are the result different environmental factors which determine their characteristics (Keddy, 2000). Keddy further describe the three distinct principles to identify these factors. These are

i) Ecosystem is produced by multiple environmental factors acting simultaneously
ii) To understand and mange wetlands scientists must determine the quantitative relationships between environmental factors and the properties of wetlands
iii) The multiple factors, that produce the ecosystem, will change through time.

2.5.1. Wetland classification, Value and Function

Wetlands can be classified based on various criteria such as hydrological regime, vegetation class. The Ramsar convention classifies wetlands into three broad categories which are Marine/costal, inland and human made wetlands (see Annex 1)[15].

2.5.2. Functions and values of wetlands

Wetlands have diversified functions that can be classified into different categories. This can be a) Hydrological function, such as flood control, ground water recharge, sediment trap b) Chemical function, refers to waste water treatment, nutrient cycling or c) Socioeconomic function includes

[15] *http://www.ramsar.org/pdf/lib/lib_manual2006e.pdf*

but not limited to food, fuel, timber, research and education, recreation and d) Habitat for animals and plants and birds[16].

The following are the general the ecosystem services that are provided by the wetlands or derived from them, according to Ramsar convention[17].

i) Flood control
ii) Groundwater replenishment
iii) Shoreline stabilization and storm protection
iv) Sediment and nutrient retention and export
v) Water purification
vi) Reservoirs of biodiversity
vii) Wetland products
viii) Cultural values
ix) Recreation and tourism
x) Climate change mitigation and adaptation

In order to get the services from the wetland and maintain the system, it requires an approach that recognizes current and future needs as well as ecological factors. Though, water related problems may vary between countries depending on various factors, such as geographical, demographic and level of development, in developing countries, like Ethiopia, The situation of the water resources is critical as institutional capacity, policy and governance aspects required to be addressed(Tesfaye,2009). The focus is not only the social and economic demands, but also environmental or ecological needs. The likes of IWRM and AM theories will help us to explain the situation, and understand the existing problems by considering these factors. The concept of Social learning could provide the chance to crate knowledge through interaction among resource users. Obviously we also need methodologies that help us to get most out of these theories. In the case of Cheffa wetland, the soft systems methodology is used. In the following chapters the significance of this methodology and the theories in situations like Cheffa wetland will be explained.

[16] *Ibid*
[17] *Ibid*

Chapter Three

Method and Methodology of the study

Problem solving is essentially a learning process. The way people use to make sense out of the situation in the ever-changing world. Research is an essential element in this process to find out the possible answers to questions or describe problems or issues. According to Grinnell, research is "*a structured inquiry that utilizes acceptable scientific methodology to solve problems and create new knowledge that is generally applicable*" (Kumar, 2005).

3.1 Qualitative Method

There are different types of researches that can be classified based on the objective of the research, application of the research and inquiry mode adapted in the process (Kumer, 2005). Based on The perspective adopted to find out the answers for questions Inquiry mode, researches can be categorized as[18]:-

- ✓ Structured approach, which is known as quantitative research and
- ✓ Unstructured approach, which is called qualitative research

Qualitative research is attempts to explore human behavior, experiences and attitude whereas Quantitative research is concerned with generating statistics through large scale survey (Dawson, 2002). In most cases, quantitative method is used in areas where there are predefined problems and structured way of finding solutions. Unlike quantitative method, Qualitative method is allows flexibility in the process and is suitable to explore the 'nature' of the problem or issues under investigation (Kumar, 2005). Though both methods have weakness and strength, this paper primarily uses qualitative research method.

3.2.Methodology

3.2.1 Systems thinking

The approaches in dealing with highly interrelated and complex problems of natural resource should be to observe the whole situation rather than the parts. This will help people to have a better

[18] *Research methodology:-A step-by-step guide for beginners, Kumar, 2005.*

understanding about situation[19]. System thinking is referred to as a holistic approach that assumes 'everything' is or can be associated or connected to 'everything' (Wilson and Morren, 1990).

Systemic Thinking, according to SDI, is "a process of understanding and transforming complex situation"[20]. There are two different dimensions in systems thinking, hard systems and soft systems. As Wilson and Morren (1990) point out, system itself is defined as '*a set of parts that behave in way that an observer has chosen to view as coordinated to accomplish one or more goals'.*

3.2.2 Hard system Methodology[21]

Hard system uses an inquiry procedure in predefined and structured problems. It is a process which uses predetermined scientific tools and techniques to solve problems. Those Problems in natural sciences such as Biology, Physics, and Engineering are best handled with hard system (*Ibid*). That means, in hard systems, there are predefined techniques or blueprints to solve problems that are e already structured. However, most attempts to solve problems in natural resources create another problem, because of interaction within environment, people and other resources. For instance, an attempt to build a dam in order to control flooding problem may have adverse effects on the environment, displacement of local people (social), or ecological degradation. Therefore, a new way of looking problems in natural resources management from a different dimension other than hard systems techniques is needed.

Most problems in natural resources management, such as water, are complex and involve several people with different and legitimate views and interests. Probably applying hard systems to solve such a problem may not be appropriate.

3.2.3 Soft systems Methodology[22]

Soft system focus on human activity system (HAS) in dealing with the complex and interrelated problems. These human activity systems are 'observable' real world activities (Ibid). The fact that human activity system and its related problems are 'ill-defined' and 'messy' dismisses the application of hard systems in such kinds of situations.

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[19] *http://systemicdevelopment.org/thinking.html*
[20] *Ibid*
[21]. *Systems Approach for Improvement in Agriculture and Resource Management (Wilson and Morren, 1999).*
[22] *Ibid*

Human activity system is defined as a set of purposeful human activities (Ibid). In a situation where there are different stakeholders and the complex situations, groups have different views (Checkland and Scholes, 1999). Hard system may not have room to consider all views and the social aspects of the situation. For example, the effects of displacement on the local people's life or ecological change as a result of dam construction or engineering solutions for flood problems could not only be addressed by hard science.

Hard versus Soft system

Hard systems	Soft systems
➢ Problem is shaped to fit the requirements of optimization assumption ➢ Starts with a system model ➢ A system is actually existed ➢ Uses exclusively Mathematical modeling ➢ Defining desired goal not understanding the whole situation	➢ Focus on problematic situation ➢ Modeling will come on later stage ➢ Conceptual or abstract systems ➢ Conceptualized modeling and mathematical modeling if appropriate ➢ Assumes Goals, desired states are ambiguous, conflicting and constantly shifting

Figure 3.1- Comparison of hard system and soft systems methodology[23]

The situation in the wetlands of Awash River basin is complex and messy. For instance, the local people (farmers and pastoralists), organizations such as Ministry of water, EPA and agriculture and rural development officers, health experts or those in commercial farming and industries have different views on the development and utilization of wetlands. Understanding these views and adopting the right approach to find a common goal need a holistic approach like soft systems. Therefore, Soft system is a better way of finding the possible improvements for the problematic situations.

If there are different factors and perspectives that are involved, the situation is simply complex. In such kinds of situations, understanding the problem is quite difficult, let alone finding the cause.

[23] *Adopted from different works on Systems thinking.*

To cope with the challenges of complexity and to understand and improve the situation the approach has to be able to clarify the ongoing happenings and facilitate thinking (Lindsay, 2010). Soft system as an approach is capable to deal with such situations, though it has its own limitations.

SSM is a holistic approach with the main task of describing the complexity of the situations (Wilson, Morren, 1990). Checkland's Soft system methodology has seven stages to deal with both 'real' and 'conceptual' world. Some of the stages, such as 1, 2, 5, 6, and 7 are steps in the real world, where people are involved. The other stages, stage 3 and 4(A and B), are in conceptual world where system thinking is used to understand how the system is working and propose potential improvements (checkland, 1999).

3.2.4. Stages of SSM

Stage 1 and 2:- Making sense out of the situation

This stage is way of learning from different perspectives by recognizing the importance of perspectives of the people involved in the situation. It is a direct experience which explores a situation and reaches for meanings. Here, the focus is on 'what' people say, value, their interpretation of the situation and the questions 'who is doing what' and 'what needs to be done' (Wilson and Morren,1990). The inquiry activities at this stage aim to build the richest possible picture of the situation that represent people's view, value and demonstrate the importance of their participation (*Ibid*). Diagrams and pictures are some of the tools used to capture and describe the situation. According to Checkland, stage 1 and 2 of the SSM are about gathering information directly from the people while thinking divergently (*Ibid*).

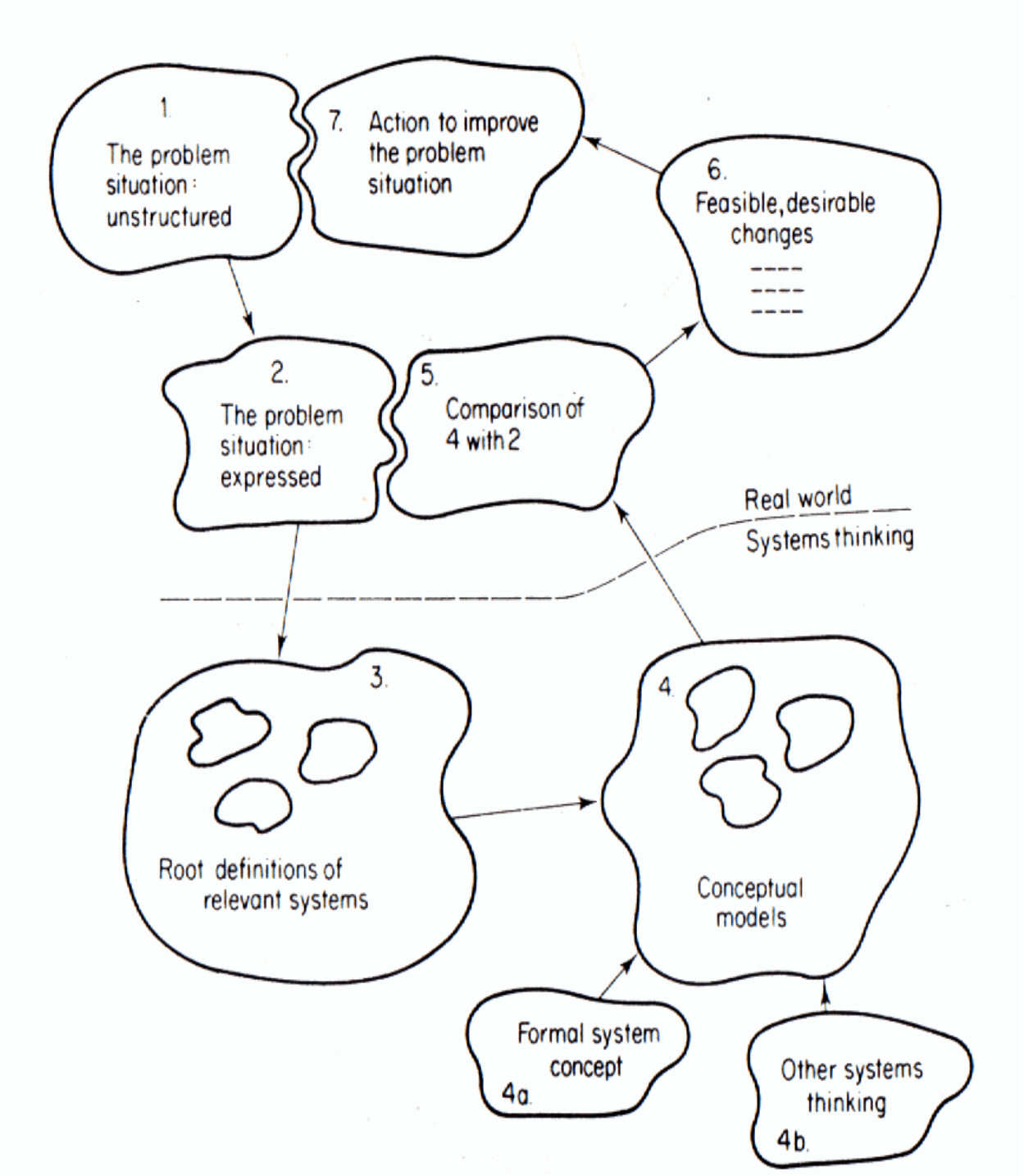

Figure:-3.2 Stages of SSM (after Peter Checkland, 1975)[24]

[24] *The digram is found in most Systems Thinking literature.*

Stage 3and 4:-Developing models of Human Activity Systems (HAS)

This is the stage where there is a shift from real world to conceptual thinking. Based on the information and the description from the previous stages (stage 1 and 2), the problematic situation should be understood. Once it is understood the focus is on the future and to imagine what the future sate will look like (Wilson and Morren, 1990). At this stage issues are identified, transformation statement is developed and expanded to become a system with the help of CATWOE or TWOCAGES[25], and then the Root definition of the systems will be defined.

Stage 3: Root definition of Relevant Systems

Instead of step up to action on of improving the situation described in the previous phase, the main objective here is to name the relevant systems of the problem from the previous stage (Checkland, 1999). That means the Human activity system is defined so as the root definition of the system.

Sage 4: Developing and testing conceptual models

For Checkland (1999), SSM is a holistic approach, and the motive behind this is to view the whole, select and describe the element comprise the whole. The external and internal relationships of elements that affect the system should be understood. Conceptual model is a tool to describe this relationship and interaction.

Conceptual model produces system models relevant to the problematic situation to describe participants share the same concern.

Stage 5: Comparing conceptual model with reality

Now it is the time to begin the comparison (stage 5) between what have been defined systems and models in the conceptual world to the real world situation. In SSM perceptions, feelings and values are recorded, analyzed, and root definitions for the system are defined. Then the human activity system will be described in the form of system model. These abstract ideas should be tested in the

[25] *Framework developed by Richard Bawden and colleagues at University of Western Sydney Australia, 1995*

reality. That is how the conceptual thinking challenges the complexity of the real world. As Wilson and his friend mentioned, it is necessary to know if it is 'what we want' and to make sure it is feasible and answers the questions 'will it work' and 'can we put it to effect'(Wilson and Morren,1990).

There are deferent techniques to do the comparison and Question-generation is one of these. It is a technique where questions are listed and systematically answered by the participants involved in the process (Wilson and Morren, 1990). These authors also suggest that the comparison can be presented in tabular format. It is also necessary to apply standardized decision making criteria to make the comparison. The criteria for measuring performances may vary in different situations. However, the basic criteria, which are known as 3Es or 5Es[26], can be used.

Stages 6 and 7: Implementing 'feasible' and 'desirable' changes

The main focus at stage 6 is to generate debate on the desirability and feasibility of the proposed changes based on the comparison made in the previous phase (Checkland, 1999). The final step is stage 7 where the proposed changes are going to be implemented. In the SSM implementation does not refer to imposed expert driven solution, rather it represents agreed and shared changes from participants and they are the one who will perform the desired change.

3.3 Tools and Method of data collection

The methods of data collections that will be used in this thesis include Semi structured Interview, Observation, group discussion with the local people and other stakeholders. Tools which are appropriate particularly this topic will be Rich pictures, Venn diagrams and Problem three. The objective of using tools such as rich picture and Venn diagram is to have a better understanding of the problematic situation and, to explore the problem and find out the possible solution provided by resource users. It is also helps to understand the relationships among the stakeholders as well as the structure and capacity of institutions and their arrangements as far as wetlands management concerned.

[26] http://www.bola.biz/research/ssm.html

Chapter Four

Cheffa wetland system

The goods and services provided by wetlands support millions of peoples in different ways. In countries like Ethiopia where agriculture plays significant roles in the economy, wetlands are the main sources of livelihood with social, cultural and economic benefit alongside ecological and economic advantages.

Studies show that Ethiopia's total annual runoff is 122.80billion m^3 from its major rivers basins which drains about 1,136,816 Km^2 catchment areas. Its ground water potential is around 2.6 billion m^3 (Tesfaye, 2009). However, there is an uneven distribution of water resources as the main river basins that contribute 80-90% of country's water resource are found in the area where there is only 30-40 % of population. But 60% the population is living in the area where there is only 10% of available water resource (WRMP, 1999). Wetlands are essential units of hydrological cycle with distinct functions. Though their ecological and hydrological function is not properly addressed, they have been supporting millions of lives all over the country.

4.1.Description and general Overview of Ethiopian wetlands

Ethiopia is a country located in the Horn of Africa with diversified ecology and highly variable topography. As studies show, Ethiopia has almost all forms of wetlands that cover 22,500 Km^2, which is about 2% of its total area, excluding coastal and marine related wetlands (Abebe and Geheb, 2003a). This includes natural and artificial lakes, swamps, marshes, floodplains and reservoirs (see Figure 4.1). It is difficult to find the correct number of wetlands in Ethiopia, for example, the National report on wetland inventory by EPA identified some 43 wetlands all over the country (EPA, 2003)[27] whereas some documents estimated the total wetlands as 73 (Abebe and Geheb,2003b).

[27] *National Report on the 43 surveyed Wetlands, EPA (Ecosystem Department. Addis Ababa 2003)*

Despite the lack of information on wetlands of Ethiopia, there has been an attempt made to classify them into abrader categories. Based on biome, one of the criteria's to classify wetlands; they can be grouped into four main categories (Abebe and Geheb 2003a).

These are wetland system in:

- ✓ Afro-tropical highlands
- ✓ Somali-Masai
- ✓ Sudano-Guinean and
- ✓ Sahelian transitional

The afro-tropical wetland system formed from the western, Eastern and Central highlands of Ethiopia. The region is the source of the country's major rivers such as Ghibe, Nile including Upper Awash river basin. The Somali-masai wetland system is composed of wetlands in the Great Rift Valley. Sudano-Guinean wetland system is found in western lowlands of Ethiopia, whereas the Sahelian transitional wetland system is located in the north eastern part of the country (Shewaye, 2003)[28].

On the other side, these wetlands are found in different forms or type. It is possible to classify them into four types such as Flood plains, Lakes, swamps and marshes, and other types of wetlands (see figure 4.1). Flood plain take the major share as it covers more than 47% of the total and lakes, swamps and marshes and other types of wetlands constitute about 30.6%,9.6% and 12% respectively.

These wetlands have been providing various services including water, grass, agricultural land wild life, recreational, flood mitigation as well as spiritual and cultural values. Their uses also include a source of pastures during dry seasons[29].

[28] *Shewaye Deribe 'Wetlands and Management Aspects in Ethiopia: Situation Analysis ' in EWNRA, Proceedings of the National Stakeholders' Workshop on Creating National Commitment for Wetland Policy and Strategy Development in Ethiopia, (AddisAababa,2008)*

[29] *Ibid*

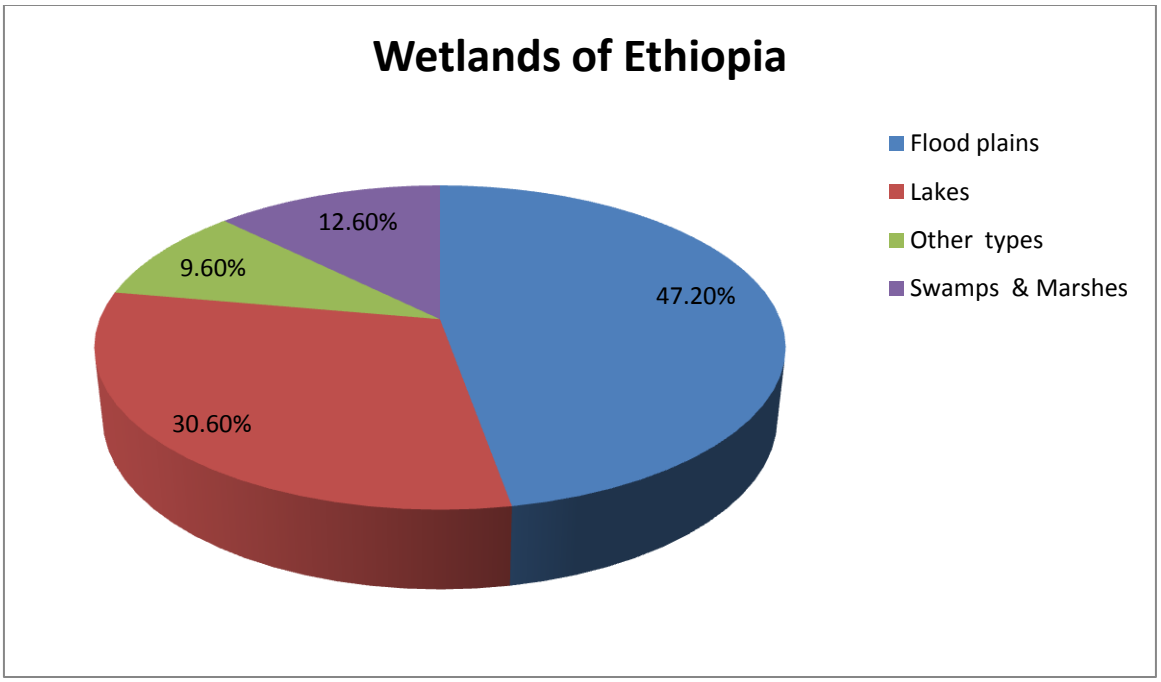

Figure 4.1 Types of wetlands of Ethiopia[30]

4.2.National policy on wetlands

Wetlands are productive ecosystems with multiple functions that could support million's life systems. Proper legislature and legal frameworks should be there to determine their use, allocation, development and protection as well as the involvement of users in decision making process. Policies are the key instruments which play a significant role in this process. Despite their importance, there is no clear legal policy in Ethiopia regarding wetlands[31]. Currently either the strategic documents or national polices of Institutions dealing with wetlands such as Ministry of Agriculture, Environmental Authority, failed to provide or backed by clear legal framework in how wetlands should be managed and utilized. However, these institutions mentioned wetlands on their strategic documents based on their interest[32].

According to the constitution all natural resources are owned by the state and the people of Ethiopia (FDRE constitution article 8(1)). The system has given the regional states the right to mange natural resources under their jurisdictions. Though it is not mentioned, wetlands are among these natural resources. On the other side, Ethiopia has not yet ratified the Ramsar conventions on

[30] *Adopted from Berhanu Tekalgne, workshop on wetlands and climate change organized by EWNRA and DF(2009),*
[31] *, EWNRA and DF, 2009*
[32] *Ibid*

wise use of wetlands (EWNRA, 2008). But Governmental organizations such as MoWR, MoARD and EPA are some of the main actors which have been playing a key role in wetland related activities. These organizations adopt strategies which suits their objectives. Accordingly, the way they treat wetlands can be different. To begin with MoWR, Wetlands are hardly mentioned on the 1999's Water resource policy apart from their hydrological and socioeconomic benefits. But the 2001 water sector strategy has mentioned about "reclaiming" existing wetlands and "preventing" the formation of new ones. It also described the need to "under take inventory" of wetlands in the country as well as developing "guidelines" in order to achieve these objectives. On the other hand, EPA has been involving actively in wetland related activities. The authority recognizes the functions of wetlands and promotes conservation of water bodies including wetlands. They conduct the first inventory of wetlands in the country and list out 43 wetlands (EPA, 2003). Recently they have also prepared a draft law on "wise use and conservation of wetlands", though it has some vague terms, and missed some key points. The other organization is MoARD which have hardly mentioned wetlands but highly exploits the resources for agricultural activities. The strategic document does not specify wetlands, rather focuses on watershed management and water harvesting with the aim of agricultural expansion (MoARD, 2010).

This shows that, the wetland management approaches is sectoral and policies are fragmented. As it is mentioned, some organizations have overlapped responsibilities due to the lack of policy or legal framework that facilitate the required coordination management systems[33]. However, the resource has been utilized for different purposes by different users. There are signs that indicate threats to wetland loss as they are under lots of pressure (Abebe and Geheb 2003a).

4.3.Ramsar convention on wetlands[34]

The Ramsar convention is an intergovernmental treaty on conservation and wise use of wetlands adopted in 1971 in the Iranian city of Ramsar. The objective of the convention in the beginning was a bit narrower as the focus was on wetlands as habitats for water birds. But over the last few decades the objective gradually broadened to recognize wetlands ecosystem and its socioeconomic and environmental benefits (Ramsar, 2006).

[33] *Tesfaye Tafese 'A Review of Ethiopia's water sector policy, strategy and program' in Taye A.(Edt.). Digest of Ethiopia's national policies, strategies and programs*.(Addis Ababa, Forum for Social Studies,2009)

[34] http://www.ramsar.org/pdf/lib/lib_manual2006e.pdf

This convention provides the definition of wetlands used in almost all wetland related documents. According to the Ramsar convention manual (2006), this intergovernmental treaty was to draw international attention towards wetlands in order to reduce the rate at which they are disappearing. So far about 160 countries signed the convention and 1919 wetlands with 'international' importance are registered.

It seems the term 'wise use' has gained acceptance among the parties that are involved in the convention, The contracting parties have been adopting this in their national policies. Wise use defined by the Ramsar convention as:-

> *"Wise use of wetlands is the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development" (Ramsar, 2007).*

Even though, there have been several attempts by NGOs and sate organization to create awareness on the importance of convention, Ethiopia has not yet ratified the convention (EWNRA, 2008 Abebe and Geheb, 2003).

4.4.Awash River Basin

Awash River basin is one of the most developed basins in Ethiopia with relatively better infrastructure. The basin covers a total area of 116,000km^2. It is the fourth largest catchment in Ethiopia but seventh in mean annual runoff (MoWR, 2006). The basin covers seven regional states and two special administrative cities, namely Addis Ababa, Afar, Dire Dawa, Oromya, SNNP, and Somali. The basin is divided into five zones based on different criteria (see Figure 4.2), whereas traditionally the main valley is divided into three main parts namely upper, middle and lower valley (see annex 2 for basin map).

4.4.1 Wetlands of Awash River Basin

The available information on wetlands of Ethiopia describes little about the nature, number and characteristics of each wetland. As it is mentioned above, there are hydrological data of the basin, though wetlands are not included. They can be categorized both as Afro-tropical highlands wetland system such as Borkena and Dillu swamps in the Upper Awash basin. The Somali-Masai wetland

system, for instance, kesem-Meteka complex, and Lake Abe complex (Leykun, 2003)[35]. The wetland types on the basin include seasonal and Permanente wetlands such as flood plains, lakes, as well as artificial ponds. The extensive agricultural, industrial and pastoral activities use wetland resources of the basin as wood (2003)[36]. The state and private cotton and crop production in the lower valley and pastoral land used by Afar, Isa and Oromo pastoralists are some of the activities on wetlands of Awash River basin[37].

Table 4.1: **Awash River Basin administrative regions and area composition**

Region	Area within the basin in km2	% age of Awash Basin	% age of the region within the basin
Addis Ababa	407	0.40%	65.30%
Afar	40,608.00	35.00%	42.60%
Amhara	15,746.00	13.60%	10.00%
Dire Dawa	1,507.00	1.30%	100.00%
Oromya	27,558.00	23.70%	7.70%
SNNP	633	0.50%	0.60%
Somali	29,718.00	25.60%	10.20%
	116,177.00	100.10%	

Source: - MoWR, 2006

4.4.2 Status and characteristics

Despite being one of the most important river basins in Ethiopia with good infrastructure, the problems of population increase in the region, increasing demand for land and water resources, desertification and wetlands degradation are some of the challenges of resource management in Awash River basin (MoWR, 2002, Kefyalew, 2003, Abebe and Geheb,2003). The report from

[35] *Leykun Abunie 'The distribution and status of Ethiopian wetlands: an overview' in Abebe, Y. D. and Geheb, K. (Eds), Wetlands of Ethiopia. Proceedings of a seminar on the resources and status of Ethiopia's wetlands(2003)*

[36] *Adrian Wood, 'Wetlands, gender and poverty: some elements in the development of sustainable and equitable wetland management' in Abebe, Y. D. and Geheb, K. (Eds), Wetlands of Ethiopia. Proceedings of a seminar on the resources and status of Ethiopia's wetlands(2003)*

[37] *Ibid*

MoWR shows that, there is a concern for more new developments in the basin than pressure from development activities in the past (MoWR, 2002). Furthermore, the document from Pastoralist Forum Ethiopia (PFE) described the pressure in the River valley by bringing out different interests such as commercial farming and increasing population (PFE, 2005).

There are also tensions and conflicts among users because of competition for natural resources. The other main concern is, for example, some wetlands of lower Awash valley are being drained for crop production, and in some areas, the livestock displaced from land that converted to large scale agricultural development is grazing the wetland (EWNRA, 2008). The Awash basin has a significant area of wetlands particularly in south Wello and Oromya special zone of Amhara regional state (EPA, 2003). Cheffa is one of these wetlands in this region.

4.4.3 Cheffa wetland

Cheffa is one of the wetlands in upland zone of the Awash Basin. It is located in Amhara regional state. It is a seasonal flood plain that covers about 82,000 ha area with significant socioeconomic, as well as hydrological importance. The wetland is formed with in two river systems, Borkana and Jara Rivers (EPA, 2003). This seasonal wetland is located at latitude 10032'-10058'N, longitude 39046'-39056'E, Altitude 1350-1450 masl. The average temperature is 12.60C to 31.90C, and Rainfall is 800 to 1100 mm per annum.

According to the EPA reports (2003) the wetland has the following uses:-

- Socioeconomic benefits: as a source of wood, and sedge for construction, water supply for domestic use, crop farming, and dry season grazing land.
- Hydrological: ground water recharge and discharge, sediment trap and flood control.
- Cultural values: traditional medicine for skin disease because of the hot springs and source of raw material for traditional mats making.

The study to design a management plan for Cheffa wetland identified the wetland Cultivation, Overgrazing, Wasteful use of water from feeder streams and Conflict over limited grazing resource

(EPA, 2006)[38] as reasons for wetland's degradation. Siltation due to land degradation and agricultural expansion other than overgrazing are some the threats to Cheffa wetland[39].

Location of Cheffa wetland

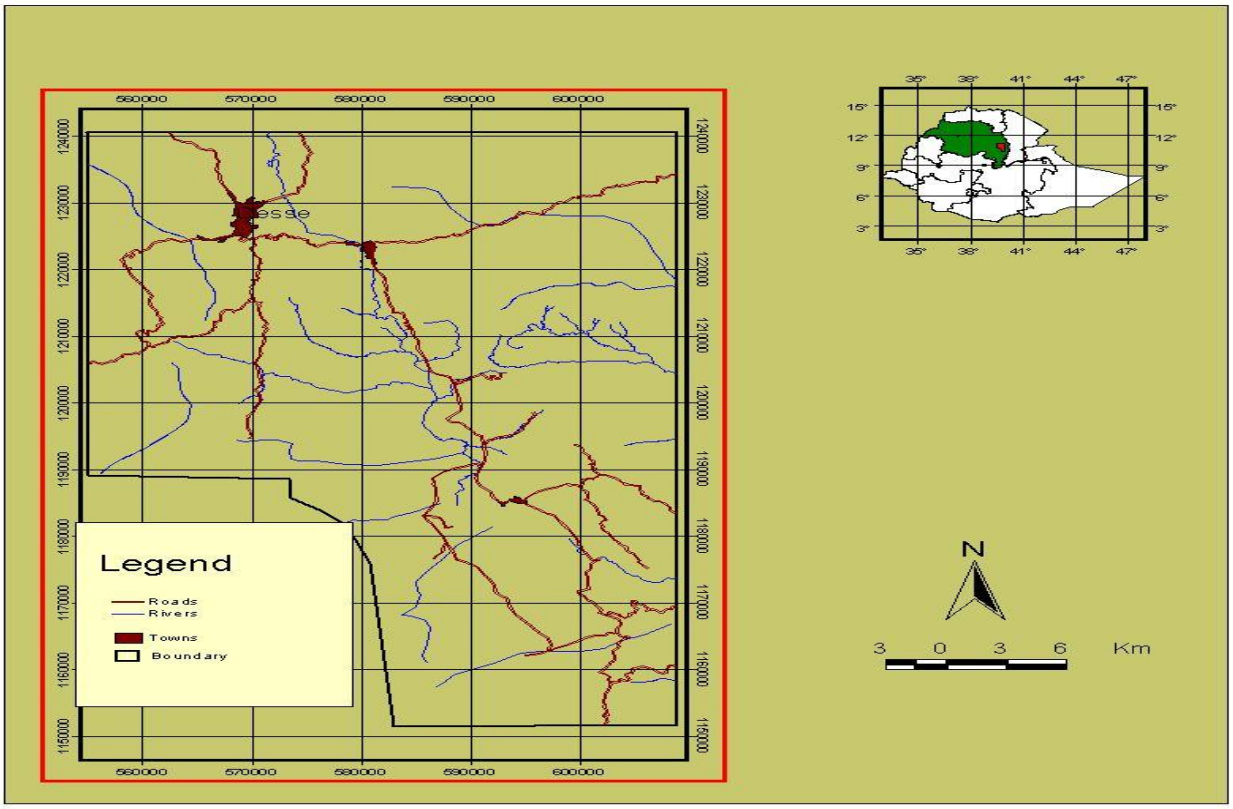

Figure 4:2 Sources: EPA, 2006

The next step is the engage, using the tools and techniques in the SSM, in the real world situation to have a better understanding on the current situation, previous attempts and the future plan to improve the existing problematic situation.

[38] *EPA 'Management plan for the conservation and sustainable utilization of Cheffa wetland', (2006)*

[39] *Ibid*

Chapter Five

Methodology in action and Findings

5.1 Working with SSM

This research has been carried out in a participatory process that includes views and opinions of local people, experts and institutions. During the 8 weeks field work (February and March 2011), stakeholders identified and participated in expressing the problematic situation of Cheffa wetland. The tools such as diagrams, pictures and Venn diagram from PRA tools are also used to understand stakeholder's relationships. The activities of undertaking conceptual modeling of relevant human activity systems, comparison of this conceptual model with the real world situation and proposed objectives and interventions for the management of Cheffa wetland are carried out.

The field work includes visiting the selected field site, Kemissee and its surroundings which is 325 Km from the capital Addis Ababa, for doing participant observation, conducting interviews, formal and informal discussions and secondary data collection. Interview with the core group of stakeholders from government and non government organizations, as well as the local people, is the main sources of the information used (see Table 5:1).

The selection of the field site was based on the discussion with people from the state ministry of water resources, which already identified Cheffa in a watershed management projects. The other stakeholders are identified during interviews and from literatures and informal discussions. The interview was primarily in Amharic, the local language in the region, and some Oromiffa (which is another local language).

5.1.1 Systems Methodology in Action

As it is mentioned earlier in chapter 3, soft system methodology has seven stages. These stages can be categorized into "real world" activities, stage,1,2,5-7 and "systems thinking "activities which are stage 3 and 4 (Checkland, 1999; Wilson and Morren,1990).

Making sense out of the situation

The main task, at this stage, is to describe or express the whole situation, not the problem, and get the best possible rich picture. Some inquiry techniques are used to identify and summarize information. At these stages data, people's opinion, feelings, perceptions and documents that represent past and current situations are collected and synthesized.

5.1.1.1 Development of Rich picture

When the soft systems methodology developed system thinkers developed a technique to analyze human activity system called Rich Picture. It is a pictorial representation of the problematic situation including every interaction and relationship. It is also a non-linear way of representation and doesn't need structure or order (Checkland, 1999). A rich picture can offer the advantage of analysts being able to review, revise and redraw and utilize a picture as a tool for discussion and shared understanding among stakeholders (Wilson and Morren, 1990).

Picture 5:1. Part of the wetland at Dawa Cheffa (Feb, 2011)

Rich picture of the situation of Cheffa wetland system

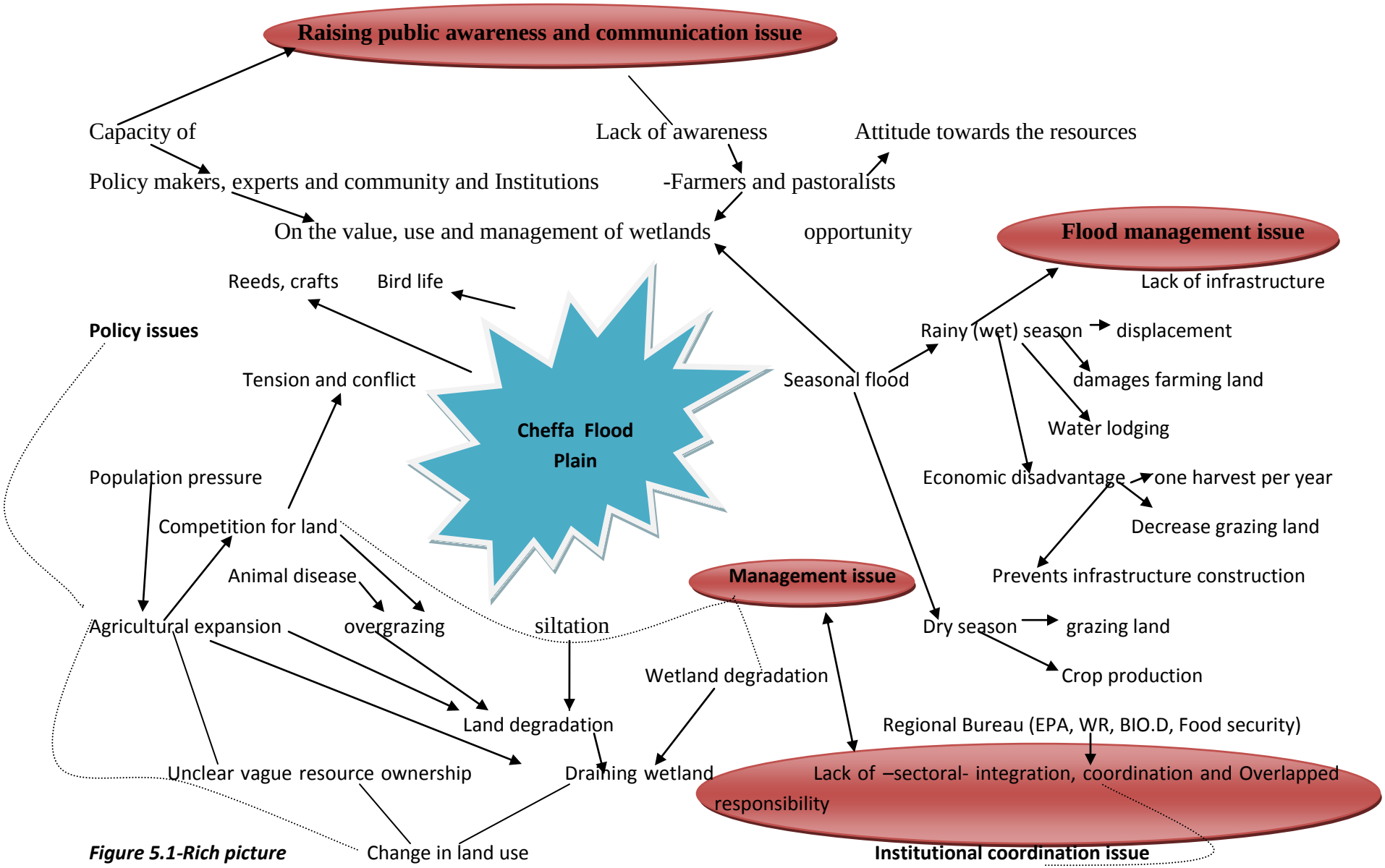

Figure 5.1-Rich picture

5.1.1.2 Expressing the problem situation[40]

The rich picture shows the situation of Cheffa wetland is complicated since the wetland is under pressure from natural and human activities. Extensive flood during rainy/wet season, June to August, cause damages to farming and grazing land and displaces the local people (farmers and pastoralists) from their home. However, it is the rainy season that maintains this wetland as it helps in ground water recharge, sediment trap and downstream flood control as well as providing dry season pasture (EPA, 2003).

The heavy flood during rainy seasons has economic disadvantage for the local people. Their access to main roads, market and social events are limited, given that there is a lack of infrastructure such as bridges and roads. In addition, decrease in grazing land and one harvest per year caused by water lodging are some of the issues over the wet season. However, during the dry season the wetland is used for crop production and a source of grazing land for the local people.

Increase in the amount of water use in the Upstream of Cheffa wetland, as a result of irrigation and small scale farming activities, using technologies such as generators and pumps, causes the decrease in the amount of available water to downstream, especially during the period April to May. But the fertile top soil eroded from the highlands in the upstream has been settled downstream in lowlands of Cheffa. The framers down streams have been benefitted from this as they are engaging in organic farming without applying any fertilizers.

The other issue is that affects the situation of the wetland is population increase in the region[41]. The available farm land and grazing land are not proportional to the population. This population increase pressurized the wetland as local people (farmers and pastoralists) compute for resources (grazing and farm land, and water). This completion creates tension and violent conflicts.

On the other hand, pastoralists from Afar come to the region looking for grazing land and water. This is not only results over grazing that lead to wetland degradation and los, but also animal disease that threatens the livestock in the region.

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[40] *Interview with the local farmers, pastoralists, regional and federal state organizations and experts from EWNRA, EPA and MoWR (see Table 5:1)*

[41] *Summary and Statistical Report of the 2007 Population and Housing Census Results shows the increase of 3,379,759(from 13,834,297 to 17,214,056).* http://www.csa.gov.et/pdf/Cen2007_firstdraft.pdf

Some people in the region engaged in uncontrolled Agricultural expansions activities as a result of unclear or vague resource ownership of the wetland, Cheffa flood plain. The absence of institutions and sound policy, on wetland use, development and protection, lead the people to drain wetlands for agricultural purpose. As a result of this, there is a change in land use. Farmer's and pastoralist's awareness on resource use for long term benefits and capacity of policy makers contribute to the complexity of the situation of Cheffa wetland.

The interconnected issues of land degradation, population pressure, over grazing and agricultural expansion threatened this seasonal wetland. There was an attempt to build small dams, dykes and related activities on the upstream of Cheffa on Borkena river by the local NGO, Organization for Rehabilitation and Development in Amhara (ORDA). And the Regional Agricultural and Rural Development Bureau attempted to participate youth farmers in 'Meher'[42] harvest through the provision of land for this purpose. However, Neither the expansion of agricultural activities nor the effect of flood has been controlled

These issues of agricultural expansion, draining wetlands, over grazing, wetland degradation, and other reasons that threatened the wetland are linked with of lack of sectoral integration, coordination and overlapped responsibility among federal and regional organizations, such as EPA, MoWR, MoARD and regional agriculture and development bureau, and fragmented policies. These are the main concerns when the issue of wetland management is discussed on the rich picture.

[42] *Meher is one of the two main crop seasons of Ethiopia,and it represents a season between September and February.*

Table 5:1 List of participants during the field work (Feb and March, 2011)

Participant representation	No of people	Category	Date	Enquiry	Remark
Individual	1	Informant	2/02-25 /03/2011	Informal discussions	Agronomist
MoWR	1	Federal government organization	03,08,09/03 and 1-2,20/03 2011	Interview	Senior expert and project coordinator
EWNRA	1	National NGO	4/2/2011	Interview, discussion and Feedback	Environmental expert
Dawa Cheffa Agr. Bureau	1	Regional government	09 /16-18 /04/2011 and 24-25/03/2011	Interview	
MoWR	1	Federal government organization	10/2/2011	Interview, discussion and Feedback	Project coordinator
MoARD	1	Federal government organization	10 and 24/02/2011	Interview, informal discussion	Soil and Water Conservation Expert
Kemisse, Dawa cheffa	7	Local people(farmers 2,pastoralist,2, others 3*)	15-18/02 and 24-25/03/2011	Interview, discussion and feed back	* Members of the community other than farmers and pastoralist
Dawa cheffa	1	Regional government	16-17/02 and 24-25/03/2011	Interview, discussion, Feedback, and Consultation	Regional ARD bureau Project coordinator
Dawa cheffa	1	a local resident	15-18/02 and 24-25/03/2011	Interview, discussion, Feedback	Plant science graduate
EPA	1	Federal government organization	24/02 and 21/03/2011	Interview, discussion, Feedback, and Consultation	Lawyer
ORDA	3	NGO	10/02-24-25/	Interview and Informal discussion	
EPA	1	Federal government organization	22/03/2011	Interview, discussion, Feedback	wetland expert
EWNRA	1	NGO	8/3/2011	Interview, discussion, Feedback, and Consultation	
Total	**20**				

5.1.1.3 Stakeholder's Identification and Analysis

The political system in Ethiopia has given the regional states the right to manage the resources under their jurisdiction. As a result, they have organized institutions depending on situations, such as capacity, population size and types of resources in the region.

Though there is no clear law, policies and institutions on wetlands, the regional and national organizations such as EPA, MoWR, MoARD, as well as NGOs such as EWNRA and ORDA are directly and indirectly involved in this seasonal wetland. The federal offices may not directly intervene in regional offices activity, since regional Bureaus are autonomous bodies. Ministry of Agriculture and Rural Development has a role of the inspection, report exchange and technical support. That focuses on projects based on watersheds not specifically on wetlands. Ministry of Water Resources has direct relationships as they have been dealing with development, use, conservation and management of water and related resources in Basins, rivers, watersheds and wetlands. Environmental protection Authority is also engaged in identifying and protections of wetlands of national and international importance. Cheffa is one of the 43 wetlands identified by the task force organized by the EPA for future development and conservation (EPA, 2003). However, it is not clear that which of the organizations are responsible for management development and conservations of wetlands. Each organization has its own interest as policies from MoARD favor agricultural expansion, which, as a result, allows draining wetlands for agricultural purpose (Shewaye, 2008). MoWR is considering the wetlands as important hydrological sources while EPA focuses on the ecological importance of wetlands. Apart from these individual approaches from these organizations, there is no sectoral-integration among these units both at national and regional level. These organizations have no specific institutional arrangement to handle wetland related issues. The other organization is Ethio-Wetland and Natural Resource Association. It is the first local NGO working on raising awareness and capacity of the public on the value and management of wetlands (ewnra, 2009). Organization for Rehabilitation and Development in Amhara (ORDA), on the other side, has been working on improving the livelihood of the people in the Amhara region since 1984[43].

[43] http://www.ordainternational.org/

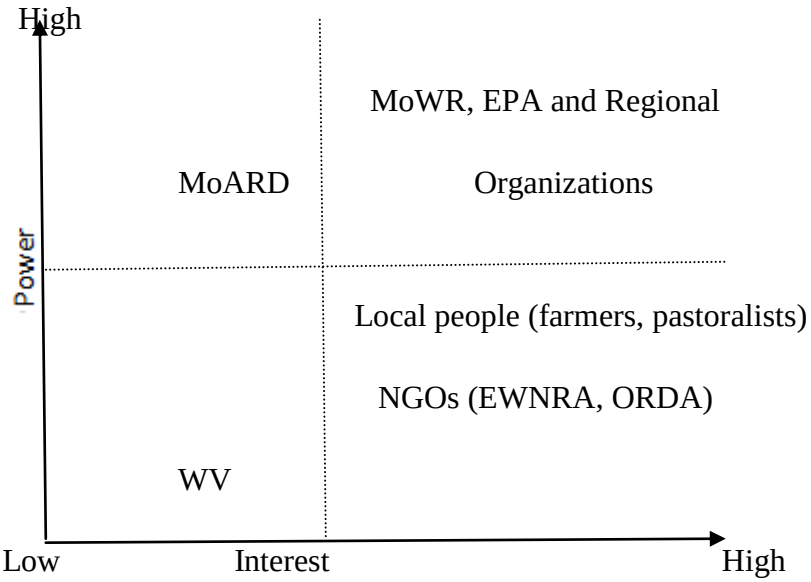

Figure 5:2 **Cheffa wetland Stakeholder Analysis power /Interest Grid**

Power can be defined here as "*the combined measure of the amount of resources a stakeholder has and the capacity to mobilize them*"[44]. Power in this context refers to the ability of stakeholders to affect the implementation of any decisions on the improvement of Cheffa wetland. Whereas interest refers to the advantages or the benefits those stakeholders of Cheffa wetland could get from the implementation of the decision.

Higher power and **interests**: The federal organizations such as MoWR, EPA as well as the regional organizations which are Amhara regional government have strong power and interest on Cheffa wetland.

High power and less **interested**: The strategic policies of by MoARD allow the agricultural expansions, sometimes, at the expanse of wetlands. This organization has no policy on wetlands, but they are one of the most active organizations in developing and utilizing of the resource.

Low power and **high interest**: The Local people are the victims or beneficiaries of any decision made on Cheffa as their livelihood depending highly on the resources, while the NGOs such as

[44] http://www.sswm.info/sites/default/files/reference_attachments/WINDBERG%202006%20Case%20Study%20Sri%20Lanka.pdf

EWNRA and ORDA are highly interested in conservation, protection and proper utilization of the wetland for long term development.

Low power and low interest: The World vision, an international NGO, is not actively working on wetland related projects, rather provides plant seeds to the farmers.

5.1.1.4 Venn diagram

Venn diagrams are one of the PRA tools that are used to identify the nature of relationships within the community and Institutions. These institutions can be formal or informal. Venn diagrams are "visual representation of the different groups and organizations within a community and their relationships and importance for decision making. The relative importance and influence, by using a circle, are represented through the relative size and closeness of the circles respectively[45].

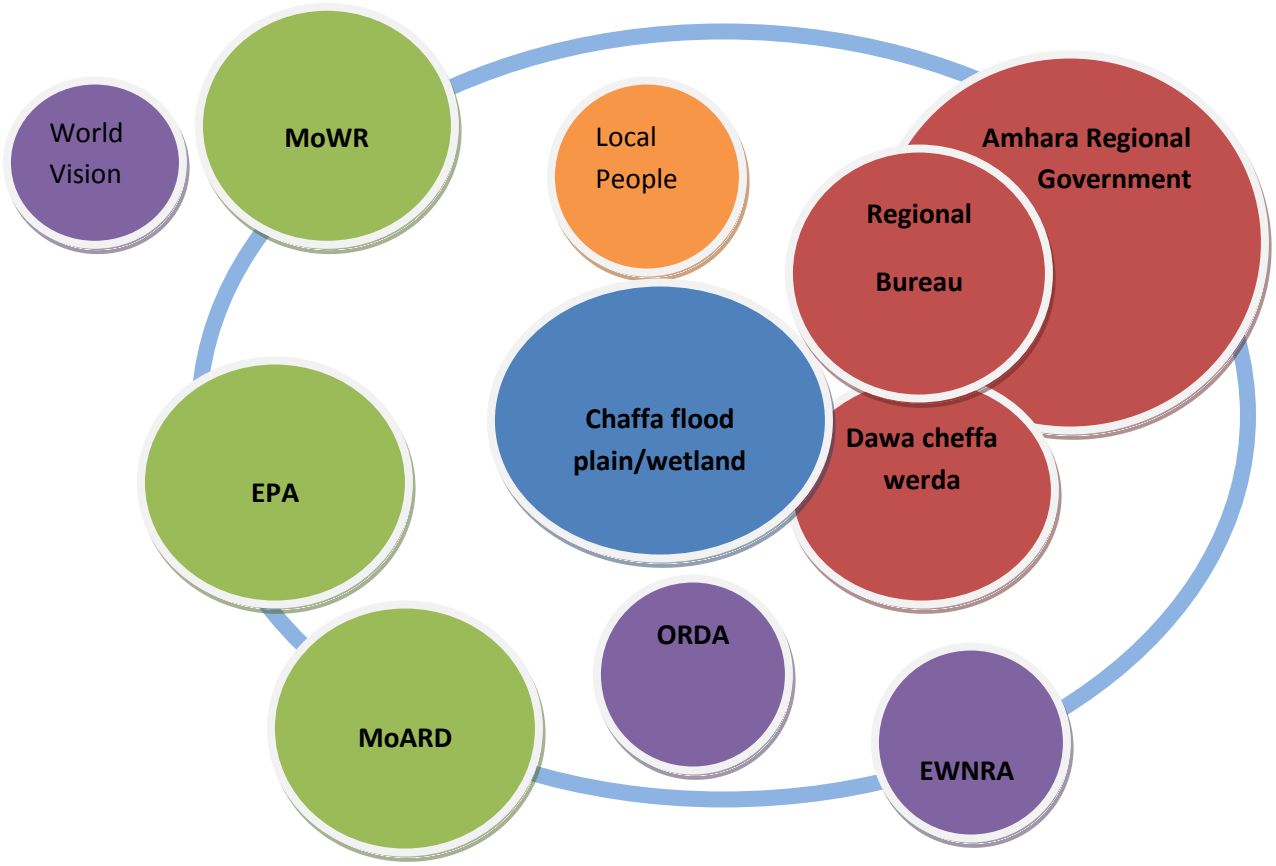

Figure 5.3:-Venn diagram of stakeholders, Cheffa Wetland

[45] *Jennifer Ritebergen-McCracken,. Participation and social assessment: Tools and Techniques, the International Bank For reconstruction and development(The World Bank, Washington D.C. USA)*

The above Venn diagram is drawn based the information from the interview and discussion with stakeholders to show the relationship among the stockholders, the level of influence and importance they have on Cheffa wetland's management use and development.

The Venn diagram shows that, the Amhara Regional state and the regional units responsible for natural resources management at a different level have a strong influence and are important in implementing decisions. Whereas the Federal organizations EPA, MoWR and MoARD, have high influence and relatively less importance on a day to day activities. This is due to the constitutional right of regional states regarding natural resources. However, they have a strong influence, since they are responsible in designing national policies and development strategies.

The other stakeholders on the Venn diagram are the local Ngo ORDA which are important and have relative influence, since they have been working closely with the people and EWNRA which is also works on raising awareness and is important but less influential. The international Ngo WV is less important and less influential. The local people are very important but have less influence than other organizations.

5.1.1.5 Issue identification

Human activities such as uncontrolled agricultural expansion (by draining the wetland), overgrazing, land degradation due to population pressure, are threatened the wetland. In addition, this seasonal flood is essential for the maintenance of the wetland. However, it also damages the farmland and displaces people from their home. From this complex and messy situation on the rich picture, some key themes of concerns are emerged and modeled to a system to improve the situation. These are A) Flood management issue B) wetland management coordination issue and C) Raising public awareness and communication issue.

1- **Flood management issue**

One of the issues that have emerged during the discussion is flood management. During rainy seasons, June to August, the extensive flood damages the farming land, displace the people and their animals. This is a big concern as they are forced to have only one harvest per year, decreases the grazing land as a result of water lodging on the farm land and adjust to the wetland. The local people most often have no access to the market and the main road because of the food. On the other hand, increase in the use of water resources upstream as a result of irrigation and small

scale farming decreases the availability of water downstream the during the dry season. Therefore, their economic and social activities are affected by both the flood and availability of water. That means designing a system that helps to manage the flood to prevent the distraction and avoid scarcity of water during the dry season is necessary.

2- **Public awareness and Communication**

The second thematic issue raised during the discussion is the issue of awareness and communication. The part of Cheffa wetlands has been converted to grazing land and farmers and pastoralists are competing for resources, and this often lead to tension and violent conflicts. This competition for resources is related to population growth, farmers and pastoralist's attitude towards the use and access to resources as well as ownership. In addition, the lack of sound policies on resource use and development and the policy makers, planners and expert's awareness on function and value of wetlands are also the reason of the existence of the problem.

Therefore, it is necessary to have a system that will raise the level of awareness of all resource users, policy makers, planers, experts and the general community to have a better understanding on functions and values of the Cheffa wetland and to share the befits derived from the resource.

3- **Wetland management coordination issue**

The third issue that has been raised during issue identification process is the issue of coordination of efforts on Cheffa wetland management. The issue of managing the wetland is necessary because it will help to have the institutional arrangement required to improve the situation of land degradation, agricultural expansion and to deal with conflicts and tensions as a result of competition for resources. The Different state organizations, both federal and regional, such as MoWR, EPA, MoARD and Amhara regional government bureaus have their policies and strategies regarding natural resources in general and wetlands in particular. Their fragmented efforts to develop and utilize or protect the resource did not bring the expected result. For instance EPA tried to developed wetland management plan for Cheffa wetland, ORDA attempted to minimize the effect of flood by constricting some small dams and dykes in upstream, where as the regional agricultural bureau distributed some hectares of land to control illegal agricultural expansions. The other local Ngo EWNRA is working on raising awareness and protection and conservation of wetlands, promotion of Ramsar convention on wise use of wetlands.

Furthermore, the overlapped duties and responsibilities of units under federal and regional organization are making the management task difficult. For example, the Federal (national) organizations responsibility is limited to Follow-ups, monitoring and evaluation The regional government organizations are autonomous bodies on the resources under their jurisdictions.

All the issues identified in the rich picture are important, but it is necessary to choose one to and study further, due to time and resource constraints. The issue of coordination of efforts on wetland management is discussed in this paper because:

a- It is will helps us to have the right management structure which is not only brings the efforts of different organization together to achieve the desired change, but also provides the imputes required to address the other thematic issues of public awareness and communication as well as flood management.
b- There is a possibility of bringing out different perspectives on resources uses and users in order to have a common and shared goal wile understanding others views.

Therefore in this thesis the Issue of Coordination will be discussed briefly.

Cheffa wetland Management system

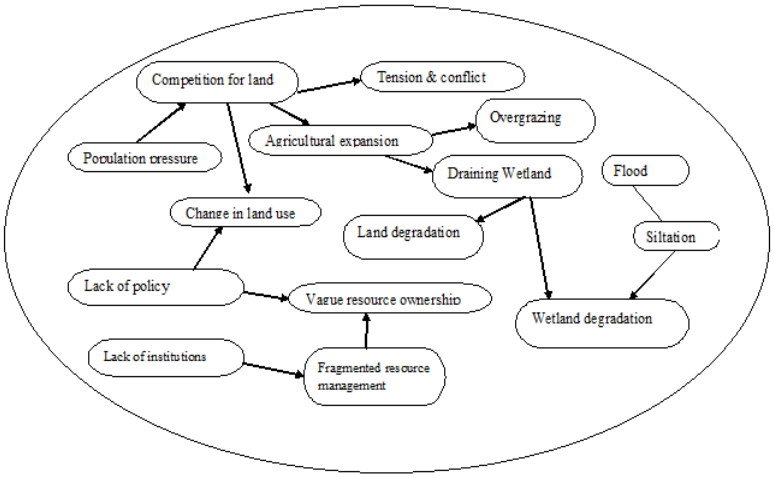

Figure 5.4- Multiple causes Diagram

5.2 Description of Cheffa wetland

The main objectives in these stages are to step it up description and analysis of the present situation to design and describe proposed future improvements by using systems thinking (Checkland, 1999).

According to Checkland (1999), there are four inquiry activities and these are:

- ✓ Developing transformation statement that shows basic features of an improved situation.
- ✓ Expanding the transformation statements into CATWOE, sometimes it is TWOCAGES, which will become systems definition
- ✓ Formulating the conceptual model of human activity systems and
- ✓ Initiating other forms of analysis, such as basic and hard system approach, based on sage 1, 2 and 3.

5.2.1 Defining Human Activity Systems and Root definition

To apply systems thinking defining 'what needs to be changed' is needed, in order to improve the existing situation or present state. These are HAS which are essential task in systems methodology. There are six basic elements in every HAS which are called CATWOE by Checkland, it is latter developed as TWOCAGES[46].

In order to understand the system we are working with, TWOCAGES is a technique used by peter Checkland to in systems methodology in defining a root definition for the idea of improvement. It helps to define purpose, boundary and subsystems. The acronym TWOCAGES is used to describe Transformation process, World view, Owners, Customers (clients), Actors, Guardians, Environment and Subsystems respectively.

TWOCAGES of Cheffa wetland system

Transformation – Central transformation process to improve the salutation.

World View: - The outlook or mental framework that makes the transformation meaningful.

Owners: - Those who controls the actual power.

[46] *Framework developed by Richard Bawden and colleagues at University of Western Sydney, Australia 1995*

Customers (Client):- Possible beneficiaries or victims.

Actor: - Those who will be involved in the actual operations for change.

Guardians:-Those who represent those who are not there and speak for themselves.

Environmental constraints: - conditions, events and influences outside the control of the Owners.

Subsystems: systems in the transformation process

TWOCAGES of Cheffa wetland system

From the key themes of concern presented in the rich picture (see Figure 5.1) at the beginning, the issue of Coordination is the focus of this paper. Therefore, the transformation statement and other elements of the TWOCAGES towards the desired changes in a situation of Cheffa wetland are described as follows.

Transformation: A system to co-ordinate government (Federal and Regional) and Non Government Organizations (NGOs) efforts to improve the management and protection of wetland resources.

World views (weltanschauung): Wetlands are critical units in hydrological cycle that needs to be managed properly. It is necessary to integrate the different organizations efforts together to maintain the social, economical and ecological values of the wetland (Cheffa flood plain).

Owners: This system will primarily owned by Amhara regional government, Federal EPA, MoWR and, the local people.

Customers: The beneficiaries of the possible improvement of Cheffa flood plain are Farmers, pastoralists, local communities and those depend on Awash River Basin.

Actors: The system of coordination of organizations to improve the management situation of the wetland, Cheffa Flood plain, is managed by Amhara Regional government, EPA, MoWR and MoARD.

Guardians: The following organizations will be the guardians of this system are Federal and regional government, EPA, and Institute of biodiversity

Environment: The environmental constraints to this system are the political structure in the country, Financial and skilled labor.

Subsystem: Information gathering and communicating, planning, designing, coordinating, capacity building and monitoring are the subsystems in the system.

Root definition

A system owned by Amhara regional state and the local people operated by the regional government (Dawa Cheffa zone), EPA, MoWR and MoARD, to coordinate the efforts of government and nongovernment organizations to improve the management and protection of Cheffa wetland for the befit of farmers, pastoralists, and local communities in the region, under financial, political, and skilled labor constraints. In this system, those who can't be presented will be represented by Federal government, EPA, Institute of Biodiversity and EWNRA. This system is considered desirable since wetlands are critical units in hydrological cycle that needs to be managed properly.

5.2.2 Conceptual modeling

A system to coordinate efforts of management and protection of Cheffa wetland

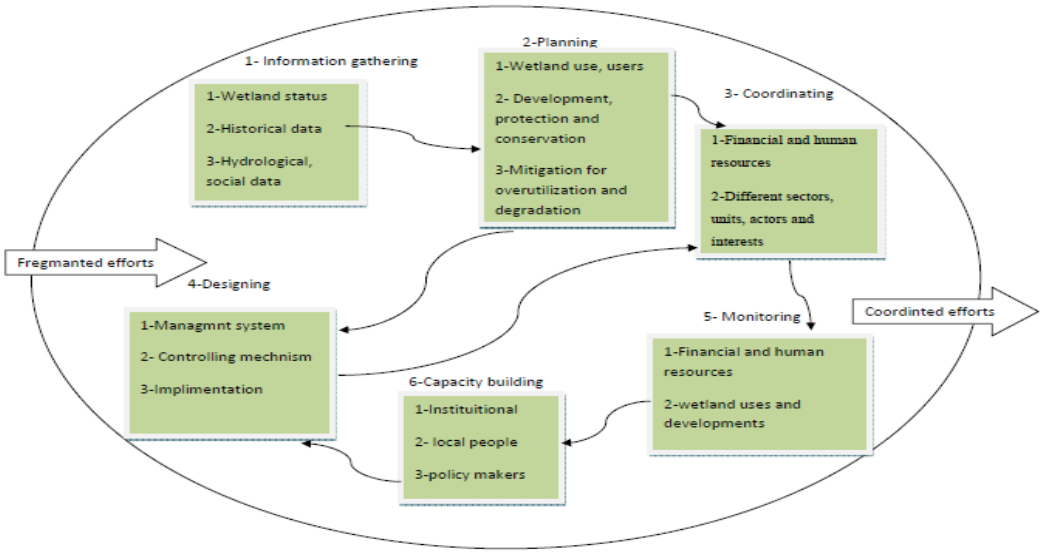

Figure 5.5 Conceptual Model for system of coordination

Table 5:1 Comparison table Cheffa wetland System

	Activity	Present in reality	Way activity could be done	Measure of performance	Desirability	Feasibility
1	Information gathering and communicating					
	a- Collect Hydrological, Social and Economic data	No	Experts	Efficiency	Yes	Yes
	b- Assess population pressure, Demand for land and water resources, Identification of problems and opportunities	No	Experts	Effectiveness	Yes	Yes
	c- Store data for future use	No	Using technology	Efficiency	Yes	Yes
	d- Transfer of information to the users , the public and policy makers	No	Publication, reports , internet ,workshops	Effectiveness	Yes	Yes
2	Planning				Yes	Yes
	a- Determine the wetland use ,development and	No	Experts	Efficacy	Yes	Yes
	b- Identify different interests and users	No	Experts	Effectiveness	Yes	Yes
	c- Decision making	No	By consensus	Efficiency	Yes	Yes
	d- Funding	No	Organizing events	Effectiveness	Yes	Yes
	e- Protection and conservation	No	Management	Effectiveness	Yes	Yes
3	Designing				Yes	Yes
	a- Institutional arrangements	No	Forming committee	Efficiency	Yes	Yes

Table 5:1 Continued

	Activity	Present in reality	Way activity could be done	Measure of performance	Desirability	Feasibility
	b- Controlling wetland use and management	No	Monitoring	Efficacy	Yes	Yes
	c- Implementation mechanisms	No	Management	Efficacy	Yes	Yes
	d- Policy recommendations	No	Experts	Effectiveness	Yes	Yes
4	Capacity building				Yes	Yes
	a- Institutional capacity	No	Providing resources	Efficiency	Yes	Yes
	b- Farmers , pastoralists and experts Understanding on wetland Value and Management	No	Training, reports and workshops	Effectiveness	Yes	Yes
5	Coordinating				Yes	Yes
	a- Financial and Human resources	No	Experts and professionals	Efficiency	Yes	Yes
	b- Linkages with in Different sectors ,organizations	No	Management	Effectiveness	Yes	Yes
	c- Interests ,actors and other activities in the system	No	Organizing	Effectiveness	Yes	Yes
6	Monitoring				Yes	Yes
	a. Financial and human resources	No	Professionals	Efficiency	Yes	Yes
	b. Wetland related activities	No	Evaluation	Efficiency	Yes	Yes
	c. Efficiency of the system	No	Evaluation	Efficiency	Yes	Yes

5.2.3 Comparing Conceptual Model with Reality

The comparison stage is all about testing the conceptual thinking in the real world. There are some techniques to do the comparison and it is also necessary to decide on the decision making criteria on how the performance of the activities should be measured. In this case 3Es[47] are used to measure the performance. These 3Es are

Efficacy –to determine the applicability and to answer, will it work at all?

Efficiency- is to determine if it works with the available resources. That is, will it work with minimum resources?

Effectiveness – does it contribute to achieve the desired goal? Does it improve the situation of Cheffa wetland?

5.2.4 Implementing 'feasible' and 'desirable' changes

As we have seen in chapter 3, Checkland's Stage 6 of SSM is about debating the desirability and feasibility of the proposed changes. After The conceptual model for the coordination of those efforts of MoWR, EPA, regional governments and EWNRA and ORDA to manage the Cheffa wetland compared with reality (see column 1-4 of Table 5.1), the next step is to debate if the proposed coordination is desirable and feasible for all users with the existing constraints. The last two columns of table 5.1 are used for this purpose.

In SSM the final stage of the whole cycle is implementation of the agreed desirable changes. This activity needs plan of which can leads to actions in a given period of time. The action plan for short, medium and long terms for Cheffa wetland is explained in table 5.2.

[47] http://www.bola.biz/research/ssm.html

Table 5:2 *Action plan for the coordination of Cheffa wetland management system*

ACTION	HOW	WHO	WHEN	Measure of Performance
Formulate –cooperation or agreement	Advisory committee	Local people, MoWR , EPA, ORDA,EWNRA and Amhara Reg.gov	Short term	Efficacy
Decision making	Consensus	System owners	Short term	3Es
Promotion	Workshops, media ,publications	Regional gov.	Short term	Effectiveness
Awareness	Workshop, meetings and focus group discussions	Advisory committee	Short term	Efficiency
Recruitment – experts or consultants	Advertisement	Advisory committee	Middle term	Effectiveness
Assigning –experts or consultants	Consensus	Advisory committee	Middle term	Efficiency
Training	Workshops and trainings	Experts	Middle term	Effectiveness
Financing	Fundraising events, Lottery		Middle term	Efficacy
Determining area for development and conservation	Scientific	Experts	Middle term	Efficiency
Reporting	Formal	All	Middle term	Efficiency
Procuring- technological and mechanical equipments	Standardization and agreements	Advisory committee	Middle term	Efficiency
Capacity building	Training and consultancy	All	Long term	Effectiveness
Policy recommendation	Public participation	Experts and committee	Long term	Efficacy
Defining ownership	Public participation	Policy	Long term	Efficacy
Research	Education institutes	Universities and institutions	Long term	Efficiency

These findings and the proposed solution to improve this particular wetland system can be explained and supported by the theory of integrated and adaptive management and other theoretical concepts considered in previous chapters. These approaches enable us to find out the efforts to be coordinated and sectors to be integrated and management systems to be adopted through active participation from stakeholders.

Chapter Six

Discussion

The extensive flood from Borkana and Jara Rivers of Awash River Basin during the rainy seasons is the starting point on the chain of problematic situations of Cheffa wetland. The flood destroys a lot of hectors of farming land and displaces people from their homes. This flood, however, is the main source to maintain this seasonal wetland. As a result of this, it has been a source for dry season grazing land for the local farmers and pastoralists and those even as far from afar region. This pastoralist movement causes conflicts and tensions within the community. On the other hand, resource competition as a result of population increase in the region resulted uncontrolled agricultural expansion, and that allows farmers to drain parts of the wetland.

The individual efforts from organizations such as EPA, MoWR, ORDA, EWNRA and some regional natural resources bureaus, either to develop, manage or to protect Cheffa wetland could not produce the expected improvement. It is obvious that to some extent all these are also related to vague resource (wetland) ownership structure, lack of national legal frameworks, institutional coordination and lack of awareness and communication on resource uses.

6.1 IWRM and Sectoral Integration

IWRM is a process that promotes coordinated management and development of water and related resources (GW-TAC, 2000). Regarding Cheffa wetland multiple uses and diversified interests from different users, there needs to be a common understanding on how benefits and responsibilities should be shared. The Sectors such as environmental protection, water resource management and agriculture have a strategic plan as far as water, land and related resources is concerned. However on the ground they don't have cross sectoral communication in implementing their strategies. The absence of the national legal framework, for instance on wetland management, contributed in this fragmented approaches. For instance, the agricultural expansion strategy by MoARD (2010) threatens the wetlands since it only focuses on the organizations objectives and there is no specific national policy on wetlands in Ethiopia. The ecological and environmental

consequences as a result of wetland degradation or wetland loss have not been taken into consideration. On the other hand, EPA attempted to identify and protect wetlands of national and international importance through inventory process. But it did not include the community whose livelihood is directly affected[48]. Though the draft national law on wetland has significant importance, some vague and contradictory points should be clarified.

IWRM is, however, an approach that allows cross sectoral integration and considers human and environmental needs. Pahl-Wostl et al., (2005) argue that IWRM provides more than 'supply' driven solutions and allows users to see the social, economic and environmental factors as well. Eventually in the case of Cheffa wetland all these factors are found. For instance, increasing trend of using the wetland for grazing and farming activities, not only have social and economic impact but also have an environmental effects. But first it is necessary to have a functional wetland in order to get the benefits out of it.

Since wetlands are neither purely aquatic nor terrestrial (Finlayson and Valk 1995), the management approach must consider all the elements and users of the resource. Stakeholder's participation in decision making process is essential. Though it has some challenges, IWRM provides the opportunity to include diversified users in order to achieve multiple interests, as well as sectoral integration. Therefore, any plan to manage the Cheffa wetland should consider all users and their interests and cross sectoral communication.

6.2 Adoptive Management approach and wetland ecosystem

Organizations that are involved in Cheffa wetland's development and management activity and the local people whose life depend on the resource for their livelihoods have different types of on the same resource such as crop production, and livestock (EPA, 2006). Due to these reason users has been competing for resources. If it is not properly addressed, it is quite likely that such competition for resources may result undesired outcomes. Since wetlands are one of the parts of complex ecosystems, a better way of handling a situation would be to adopt an approach that improves the management of Cheffa and accommodate changes by learning from the past and

[48] *During the inventory process the task force is organized from different organizations but not from the local community (EPA, 2003).*

current situations. This shows the need to have adaptive management approach to resource management system. Unlike other approaches such as IWRM, Adaptive management provides the luxury of 'flexibility' and 'adaptive potential' of a given system (Madema and Jeffery, 2005). Therefore, combining these two approaches may improve the situation, since, in IWRM, cross sectoral integration, and active participation of stakeholders, planners, and policy makers at all levels is possible, while adaptive management provides the responsiveness of the system to external changes. Despite frequently raised challenges, experiences from other researches carried out in different countries such as India on different water and related resources shows the possibility of applying IWRM and AM to mange different competing interests. For example, the case of study in India on East Kolkata wetland system shows that the possibility of having better outcome thorough applying and integrated and adaptive management approaches. According to report, the East Kolkata wetland system covers 12,500 hectares, have 254 sewage fed fisheries, solid waste farms with about 250million litters of sewages flown every day (Shivashis in Pahl-Wostl et al. 2008). At the time, the wetland system provided 11,000 annual edible fish and 150 metric tons of vegetables. However, the following were the concerns of the community and administrative body.

- Most parts of the city don't have centralized sewage treatment and collection
- pollution, environmental degradation, mosquito and risks related to health
- Land and water bodies has been reduced because of Urbanization and population growth
- The main concern was the urban flooding during the monsoon period (June – September)

It was necessary to improve the situation. That is to maintain the values and functions of resources and satisfy those needs in relation to urbanization and population increase. In order to address this messy and somewhat complex issue the professionals from different fields, planners and environmentalists as well government units have introduced an integrated and adaptive way of resource management. This includes the active participation of all parts of the community and administration (Ibid).

Therefore, practically possible to apply both Integrated and adaptive management in a situation where there are diversified interests on resources and making in decisions under uncertainties.

6.3 Socioeconomic needs and Functional wetlands

It is necessary to realize that the extent of water and related resource management are not only limited to the use of such resources for current needs. More impotently it is the decision about the allocation of the resource by considering the future needs and environmental and related factors. As some explained it,

> *"…management that treats different aspects of water, e.g., hydrological, ecological, and Socioeconomic, separately, ignores their inherent interdependency, possibly at the expense of long term sustainability*" (Engle et al., 2011).

One of the principles of IWRM approach is active participation of all users and stakeholders (GWP-TAC, 2005). In management systems for Cheffa Wetland, it is necessary to include participation of all users including planners, the local people, the regional state and EPA, MoWR, MoARD as well as NGOs. Having all these users of different interest and agreed to a common or shared goal, help to maintain the ecological functions of the wetland while satisfying socioeconomic needs. This requires responsible institutions to manage the wetland. Because it not only the effort of single institutional body that brings the desired change, rather shared responsibility among users. As Jonathan et al., (2011) pointed out, the responsibility for allocation, use and development of the resource should not been left only to state actors, instead it must have consisted of social, economic and political administrative systems.

Therefore, the Management of Cheffa wetlands should not only the responsibility of either the Amhara regional state or the federal institution, such as EPA, MoWR, but also the civil society organizations such as ORDA, EWNRA and particularly local people.

6.4 Learning from participation

Learning is a cyclic process that enables people to understand changes, new knowledge and different views. When stakeholders come together and discuss ideas, feelings and desires, it will facilitate the way to achieve the goal to get shared understanding (Mostert 2007). In the same way as Blackmore (2007) pointed out that one of the important things in the learning process is 'co-creation of knowledge' through interaction which in return can make trust building among stakeholders easier.

In a situation where there are multiple stakeholders with diversified interests and competing for resources, learning together from interaction will assist users with different goals to gain knowledge to take shared action. As a result, change in behavior towards issues and agreements on how to manage these issues is possible (Blackmore 2007).

Hence, it is necessary to build truest and mutual respect in order for stakeholders to take shared action. The case of Cheffa wetland is not different from this. The stakeholders have to understand the convergence goals and need to build mutual respect and trust among themselves. This can only be achieved through interaction to enable them to understand other's interests and share knowledge. Therefore, it is likely that wetland management can be based on the shared action of all users and actors involved.

6.5 Systems approach and wetland ecosystem

Water problems are complex in nature and involve multiple actors. These problems in most cases, at least partially, are the results of past actions. Any actions at the individual level may have a significant effect on wider social, environmental and political context (Reynolds and Holwell 2010). This makes the systems thinking better choice as an approach to address such problematic situations. Hence it is better thinking in a way that the parts in the system are interrelated and understanding the whole instead of separating individual parts while dealing with such complex problems (Wilson and Morren, 1990). Systems thinkers argue that it has different the features. It allows us to think the situation as it is now and what it might be in the future[49].

Wetlands are ecosystems that have parts including water, plants and land with multiple functions and users (Keddy, 2000). They have such complex structure that every part of the ecosystems is interrelated, and any action by users of the resource may affect the wetland system. For instance, an attempt to increase agricultural production or excessive grazing over the wetland area could have social and environmental consequences. As Wilson and Morren (1990) mentioned, any action from a person or organization has a significant effect on land, water and other social resources around the wetland. Keddy (2005) also pointed out that wetland system is a result of simultaneous act of various environmental factors and those factors will change over time. Therefore to understand and manage wetland ecosystem the approach has to be a holistic one.

[49] http://users.actrix.co.nz/bobwill/ssm.pdf

Because systems approach prefers to see the whole picture to improve problematic situation, wetland management should be improved systemically.

6.6 Challenges of Implementation

When IWRM is discussed broadly, it brings other aspects to water and related resources management. In this approach, different sectors and fragmented strategies can be integrated with the idea of, common and long term, social, economic and environmental benefits from the resources. Having said that, the main challenge in implementing what has been agreed under IWRM, for example, the multiple users and actors in Cheffa wetland may adopt IWRM approach to improve the management, but the question is how it can happen on the ground.

One of the fundamental and interesting elements of behind the concept of IWRM is 'enabling environment'. It, according to GWP, refers to the required policies and legislations and strategies (GWP-TAC, 2004). It is impossible to convert ideas into actions unless the rights and responsibilities of all that involve are clearly identified and described.

Despite the fact that the idea of adopting IWRM is addressed in the 1999's water resources policy of Ethiopia, EPA has draft law on wetland, and the constitution has given the general privilege to regional state to mange resources under their jurisdiction, there is no clear national policy or legislation regarding wetlands. It is quite clear that it is why different sectors such as water resource, Environmental protection and agriculture are adopting strategies based on their organizational goals. Because of this individualistic approach, which is related to the absence of national policies, the long term values and functions of the resources could be threatened. It is because natural resources are scarce and users compete for resources. The consequence could be far worse in the absence of legal and institutional frameworks to ensure that the long term benefits and values of the resources have not been compromised.

Therefore, adopting the right management approach, formulating sound national policy as well as refereeing and having international conventions such as Ramsar, which is not yet ratified by Ethiopia, could highlight the way in which wetlands can be managed. Hence, the objective to satisfy the socioeconomic needs and to maintain functional wetland system can be attained.

Chapter Seven

Conclusion and Recommendations

7.1. Conclusion

The interlinked problem of extensive flood, over grazing and agricultural expansion partly explains the extent to which the situation of Cheffa wetland is messy. The wetland users are working independently, though there are multiple users and actors such as farmers, pastoralists, EPA, MoWR, and MoARD. The ownership status of the wetland is not also clear and no legal framework or legislations regarding wetlands at national level. These make the situation complex and the management activity very difficult. As a result, users have undefined responsibility that exposes the resource for over exploitation or threatens to lose its function or resource degradation. Maintaining functional wetland on one hand and satisfying those different needs of users is a challenging task.

Therefore, in order to manage situations this is balancing socioeconomic and ecological needs. It is necessary to adopt a management approach that integrates different sectors and subsectors which allows active participation of all users and actors. It is also necessary to have a common goal for long term benefits through shared action that brings desired change. Generally speaking, it should be a holistic approach because as Engle et al. (2011) mentioned it is not possible to have a long term benefits while different aspects of water resource are treated separately.

It is hard to pick a single approach to achieve this goal. For example, IWRM is a suitable approach for sectoral integration, public (users) participation in decision making and applying the available technological tools to manage water and related resources. As Odendaal (2002) sited in Pahl-Wostl, C. et al. (2005) mentioned, the main goal in the IWRM approach is

> *'[T]o find the right balance between protecting the water resource itself while meeting social and ecological needs and promoting economic development".*

But the main challenge here is the rigidity of IWRM when it comes to external and structural changes. We need to fill this gap and adopt management approach that adds flexibility and responsiveness to the system, which is Adaptive management.

In the meantime, it is necessary to find the elements, their relationship and interactions within the system. Regardless of its time consuming process and may not be appropriate in a situation where urgent action is needed, SSM will help us to consider the whole in order to understand the system and of course to deal with the emerging issues in the process. Probably it is the better way to address the issue of computation for resources among stakeholders as well as to recognize the ecological values for long term use. It is obvious that finding the right balance for these competing interests for the wetland, and satisfying social, as well as ecological needs, is difficult but a necessary action. Therefore, IWRM and AM approaches are necessary to achieve the overall objectives of wise resources use without compromising future needs.

In Ethiopia, unlike other issues, we can see that problems regarding wetlands are not only the question of implementations; rather it is the lack of clear national policy on use, development, protection of wetlands. Therefore, in order to manage the competing interests on wetland resources particularly in the Awash River Basin and Ethiopian wetlands in general, needs an integrated and adaptive management resource management approach as an alternative to the existing fragmented and sectoral approaches.

7.1.Recommendations

It is strong to claim that the findings in this paper and the approach used are the only options to manage the situation like Cheffa wetland. But is an opportunity to see the situation from a different angle, and bringing in different perspectives.

It is obvious that it is hard to manage any resource in the absence of a legal framework and policy. It is not also easy to pick a single responsible body when there is no clear ownership status and little hydrological and social data.

By taking all these factors into consideration, the following are, based on the findings in this paper, the main actions that should be taken to bring the desired change in the wetland.

- Forming management body, (advisory committee) that consists of the local people, EPA, MoWR, MoARD and regional government to coordinate different activities.
- Cooperation among different users, state and non-state actors
- Designing decision making mechanism that allows all stakeholders to engage in the process.
- Raising awareness on wetland values, functions of the local people, experts and policy makers.
- Creating the appropriate channel for information flow and communication
- Finding both financial and human resource required to achieve the objective
- Providing the necessary and available technological tools
- Promoting research activities
- Defining ownership status by giving priority to the local people.
- Recognizing the role of adopting IWRM and adaptive Management approaches in managing the wetland.

These are more specific to the situation of Cheffa wetland, but there are more general actions that should be taken at the national level which has a direct impact on this situation at the lowest level. The other general recommendations to mange wetlands at national level include:

- Designing national wetland policy that considers all users, actors and most importantly the local people.
- Promoting public participation in decision making process
- Designing institutional arrangements which includes all stakeholders
- Building institutional capacity
- Creating a link between different sectors
- Considering ratification of Ramsar Convention
- Ratifying the draft law, of wetland management and protection proposed by EPA with some critical review.

Since this recommendation is only based on the findings in this paper which is carried out in relatively short time, further investigations and researches are required to give more comprehensive recommendation to improve the situation. However, it gives a highlight to points that should be considered to have a better management system. This includes needs for

institutional arrangements and building the capacity of these institutions to enable them to take the required decision, active participation of all users in all level, the active role of the local people to participate in decision making in particular.

It also shows the benefits that could be driven form modern theoretical approaches. The cross sectoral integration and communication in managing water and related resources, which is not found in traditional and fragmented approaches, is the essential element. The holistic and integrated approaches that could systemically improve the management of water and related resources are required to properly adders the existing competing interests. IWRM and AM allows to design a better water and related resources management system.

Therefore, the reconditions to improve the situations in Cheffa wetland system should consider the application these two approaches (IWRM and AM), though not be limited to the points listed above.

7.2.Reflection

The whole process of this thesis is full of experiences with a lot of challenges. It begins with choosing the topic and then working methods, methodologies as well as describing findings thorough standardized and universally accepted theories. Most importantly doing the field work and applying the theories was the biggest challenge. It is relatively straightforward to describe both theories of IWRM and adaptive management. It is difficult when it comes to apply these theories on the ground with real world problems. For me, the challenges were working with the people in real problems and applying the principles of IWRM to that specific case, and the intention of having a holistic approach to deal with the situation. For instance, in principle IWRM has all it takes to integration and in dealing with different sectors involved in water and related resources. Rahaman and Varis (2005) pointed out that there are challenges when it comes to implementation. Different situations at different regions, the political, social, economic conditions and status of countries, the extent of the problem are some of the challenges towards the implementation of the general principles of IWRM approach.

The other issue was the high expectations of the local people to get the desired change urgently and some organizations or responsible individual's reluctance to take the case seriously. On the

other hand, applying a methodology like SSM requires a lot of time and finance. It is a long process that needs to go back and forth. It is also requires a huge commitment of participants to get the result. These are the challenges in applying a cyclic process which needs active participation both from participants and the facilitator. For example, I have to go several times to different offices and individually to discuses, present or to get feedback about the findings and explain the situation, since it was difficult due to financial reasons to bring all stakeholders in one place.

However, SSM is a methodology that provides a better outcome when it is done by taking enough time and allocating enough resources, bringing all stakeholders together and, thorough active, participation of all users at all levels. These include organizing workshops, discussion forums and other mechanism to get feedback from all parties involved. That is how the methodology brings out different perspectives that will give us a better big picture of the situation. Having the possible big picture of the situation in return will help us to identify and prioritize the issues to improve the existing situation. On the other hand, the system allows the actual beneficiaries to understand other views and to reach at a common goal and take a shared responsibility.

Therefore, it will be better if the methodology is implemented by:

- Allocating relatively longer time for field work, in this case it is only two months.
- Bringing stakeholders in one place in order for them to be able to share ideas, to express their concerns, and to debate on possible solutions and get feedback.
- Enough fund to carry out both the field work and paper work
- Application of more PRA tools such as seasonal calendar, force filed analysis and time line
- The collaboration from other types of researches, such as water chemistry, Hydrological science

Therefore, SSM is effective if these elements are considered. For me, the challenge was to bring all those elements together. Despite the fact that the method of data collection for this thesis is suitable and applicable in these kinds of the situation, there has been a challenge from different directions. One of these challenges is implementation of this methodology to get the information needed. For instance, the observation needs attention, and it is time consuming, while the local language used in interview has also limited the questions or needs more explanation to address the

topic under discussion. The common challenges on understanding and implementation of IWRM and Systems methodology among participants are the other point learned while dealing with this study. Keeping the confidentiality of some of information, such as personal characteristics, names and privacy as Jorgensen (1989) pointed out that the ethical challenges but essential part of the thesis. Finally, I would say I can agree with Alvesson and Sköldberg (2000) explanations that interpreting data collected through the selected methods correctly to represent the reality requires the knowledge, experience and the outlook of the interpreter.

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Annexes

Annex 1

Information Sheet on Ramsar Wetlands (RIS), page 78-**33**

Ramsar Classification System for Wetland Type

The codes are based upon the Ramsar Classification System for Wetland Type as approved by Recommendation 4.7 and amended by Resolutions VI.5 and VII.11 of the Conference of the Contracting Parties. The categories listed herein are intended to provide only a very broad framework to aid rapid identification of the main wetland habitats represented at each site.

To assist in identification of the correct Wetland Types to list in section 19 of the RIS, the Secretariat has provided below a tabulations for Marine/Coastal Wetlands and Inland Wetlands of some of the characteristics of each Wetland Type.

Marine/Coastal Wetlands

A -- Permanent shallow marine waters in most cases less than six meters deep at low tide; includes sea bays and straits.

B -- Marine subtidal aquatic beds; includes kelp beds, sea-grass beds, tropical marine meadows.

C -- Coral reefs.

D -- Rocky marine shores; includes rocky offshore islands, sea cliffs.

E -- Sand, shingle or pebble shores; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks.

F -- Estuarine waters; permanent water of estuaries and estuarine systems of deltas.

G -- Intertidal mud, sand or salt flats.

H -- Intertidal marshes; includes salt marshes, salt meadows, saltings, raised salt marshes; includes tidal brackish and freshwater marshes.

I -- Intertidal forested wetlands; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.

J -- Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea.

K -- Coastal freshwater lagoons; includes freshwater delta lagoons.

Zk(a) – Karst and other subterranean hydrological systems, marine/coastal

Inland Wetlands

L -- Permanent inland deltas.

M -- Permanent rivers/streams/creeks; includes waterfalls.

N -- Seasonal/intermittent/irregular rivers/streams/creeks.

O -- Permanent freshwater lakes (over 8 ha); includes large oxbow lakes.

P -- Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes.

Q -- Permanent saline/brackish/alkaline lakes.

R -- Seasonal/intermittent saline/brackish/alkaline lakes and flats.

Sp -- Permanent saline/brackish/alkaline marshes/pools.

Ss -- Seasonal/intermittent saline/brackish/alkaline marshes/pools.

Tp -- Permanent freshwater marshes/pools; ponds (below 8 ha), marshes and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season.

Ts -- Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.

U -- Non-forested peatlands; includes shrub or open bogs, swamps, fens.

Va -- Alpine wetlands; includes alpine meadows, temporary waters from snowmelt.

Vt -- Tundra wetlands; includes tundra pools, temporary waters from snowmelt.

W -- Shrub-dominated wetlands; shrub swamps, shrub-dominated freshwater marshes, shrub carr, alder thicket on inorganic soils.

Xf -- Freshwater, tree-dominated wetlands; includes freshwater swamp forests, seasonally flooded forests, wooded swamps on inorganic soils.

Xp -- Forested peatlands; peatswamp forests.

Y -- Freshwater springs; oases.

Zg -- Geothermal wetlands

Zk(b) – Karst and other subterranean hydrological systems, inland

Note: "floodplain" is a broad term used to refer to one or more wetland types, which may include examples from the R, Ss, Ts, W, Xf, Xp, or other wetland types. Some examples of floodplain wetlands are seasonally inundated grassland (including natural wet meadows), shrublands, woodlands and forests. Floodplain wetlands are not listed as a specific wetland type herein.

Human-made wetlands

1 -- Aquaculture (e.g., fish/shrimp) ponds

2 -- Ponds; includes farm ponds, stock ponds, small tanks; (generally below 8 ha).

3 -- Irrigated land; includes irrigation channels and rice fields.

4 -- Seasonally flooded agricultural land (including intensively managed or grazed wet meadow or pasture).

5 -- Salt exploitation sites; salt pans, salines, etc.

6 -- Water storage areas; reservoirs/barrages/dams/impoundments (generally over 8 ha).

7 -- Excavations; gravel/brick/clay pits; borrow pits, mining pools.

8 -- Wastewater treatment areas; sewage farms, settling ponds, oxidation basins, etc.

9 -- Canals and drainage channels, ditches.

Zk(c) – Karst and other subterranean hydrological systems, human-made

Tabulations of Wetland Type characteristics

Marine / Coastal Wetlands:

Saline water	Permanent	< 6 m deep	A
		Underwater vegetation	B
		Coral reefs	C
	Shores	Rocky	D

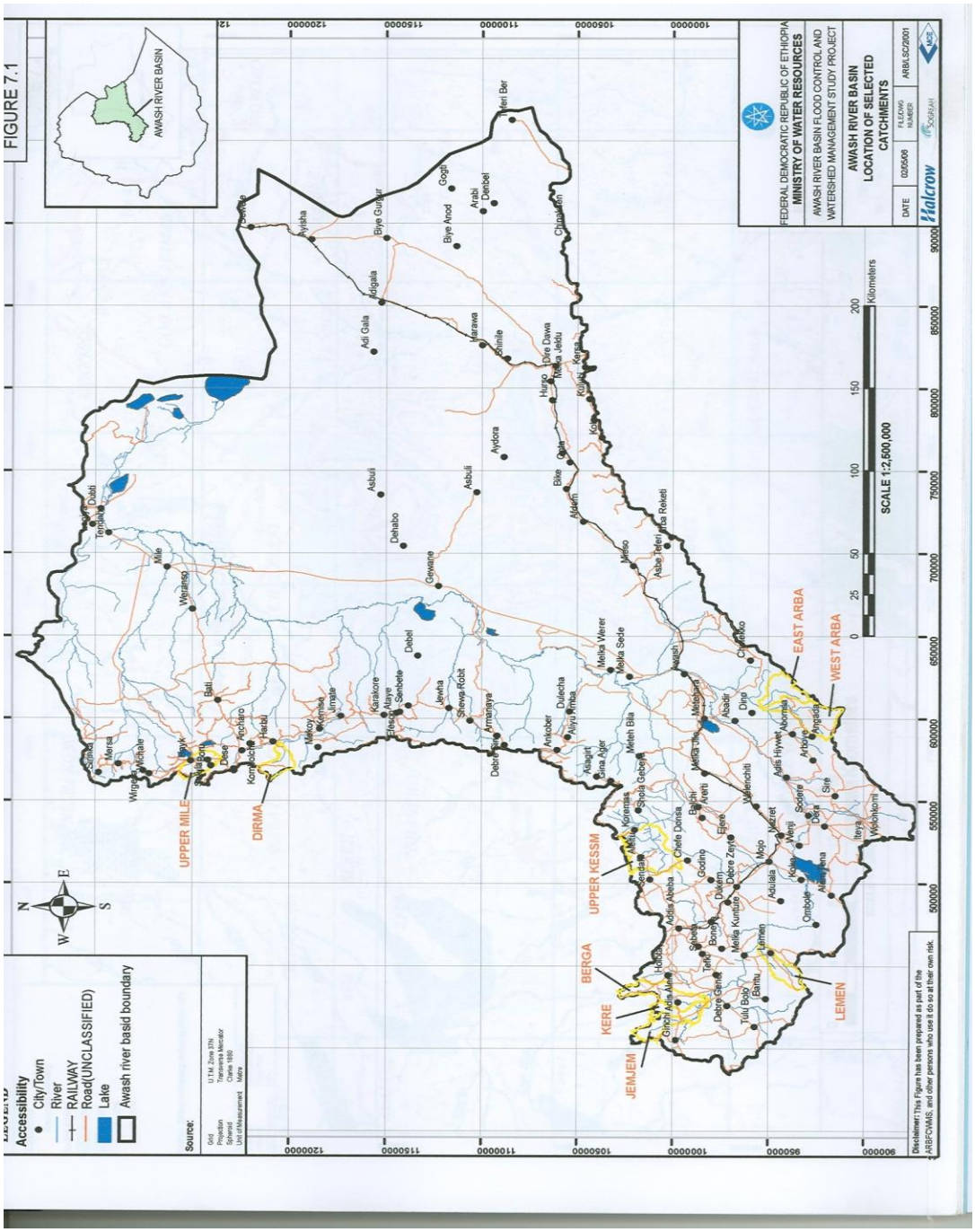
		Sand, shingle or pebble	E
Saline or brackish water	Intertidal	Flats (mud, sand or salt)	G
		Marshes	H
		Forested	I
	Lagoons		J
	Estuarine waters		F
Saline, brackish or fresh water	Subterranean		Zk(a)
Fresh water	Lagoons		K

Inland Wetlands:

Fresh water	Flowing water	Permanent	Rivers, streams, creeks	M
			Deltas	L
			Springs, oases	Y
		Seasonal/intermittent	Rivers, streams, creeks	N
	Lakes and pools	Permanent	> 8 ha	O
			< 8 ha	Tp
		Seasonal/intermittent	> 8 ha	P
			< 8 ha	Ts
	Marshes on inorganic soils	Permanent	Herb-dominated	Tp
		Permanent/ Seasonal/intermittent	Shrub-dominated	W
			Tree-dominated	Xf
		Seasonal/intermittent	Herb-dominated	Ts
	Marshes on peat soils	Permanent	Non-forested	U
			Forested	Xp
	Marshes on inorganic or peat soils	High altitude (alpine)		Va
		Tundra		Vt
Saline, brackish or alkaline water	Lakes	Permanent		Q
		Seasonal/intermittent		R
	Marshes and pools	Permanent		Sp
		Seasonal/intermittent		Ss
fresh, saline, brackish or lkaline water	Geothermal			Zg
	Subterranean			Zk(b)

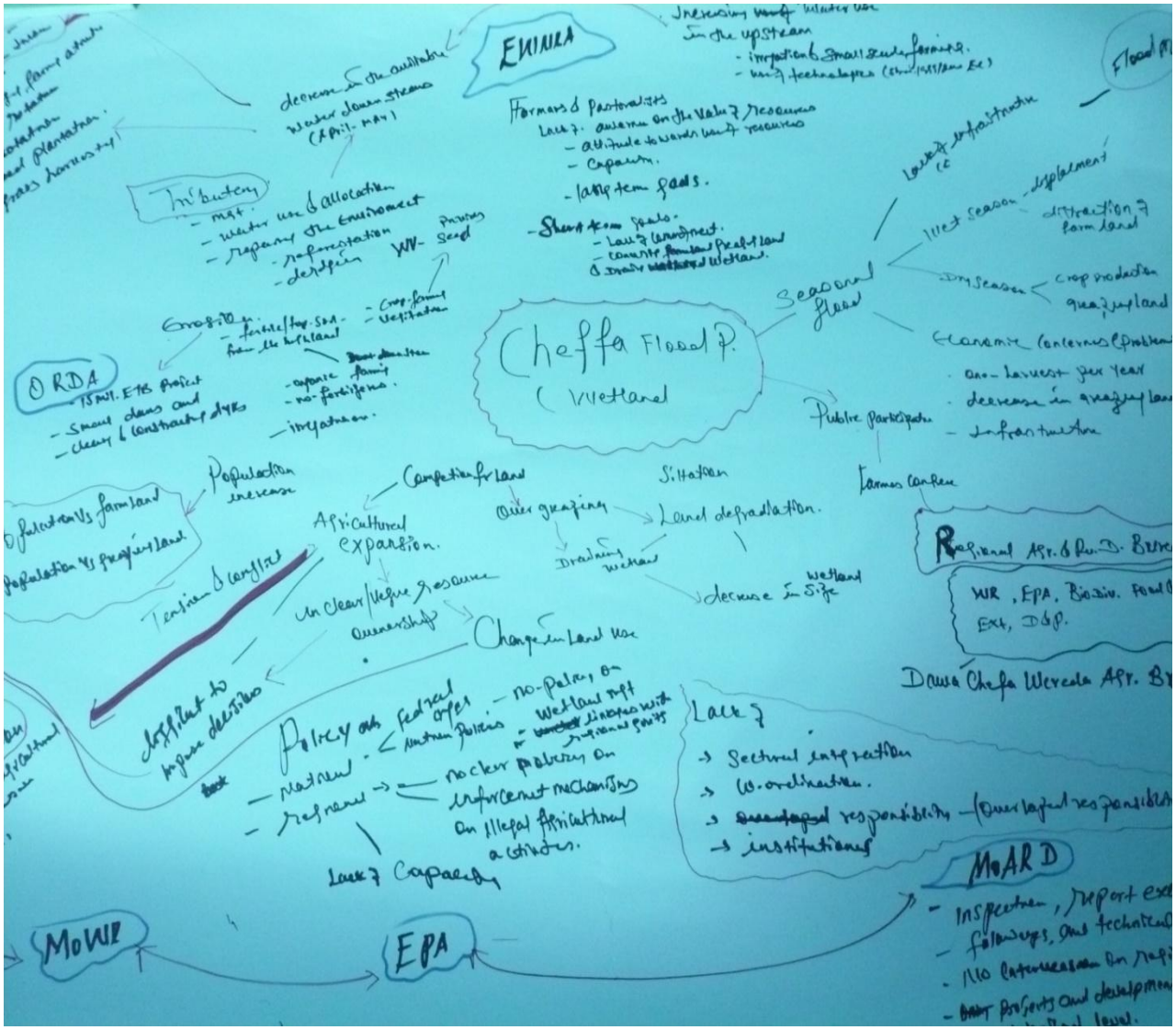
Annex 2

Awash River Basin Map



Annex 3

Rich picture



Pictures of the wetland

Dawa Cheffa, 2011

Kemissee , Artuma fursi kebele ,2011