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e-mail:kirotch@gmail.com

Noragric

Department of International Environment and Development Studies

P.O. Box 5003

N-1432 Ås

Norway

Tel.: +47 64 96 52 00

Fax: +47 64 96 52 01

Internet: <http://www.nmbu.no/noragric>

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Declaration

I, Kiros Woldeab Teklehaimanot, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature.....

Date.....

To my parents

Abstract

This thesis gives an overview of the governance structure in biodiversity offsets, the arguments for and against it as a delivering mechanism to achieve a “no net loss” target in biodiversity and the current process of innovating biodiversity offsets in the UK. In total, I have analyzed 55 biodiversity offsets programs; to see what governance structures (institutions and actors) characterize biodiversity offsets. Then I have studied the arguments in the academic literature regarding what are the potentials of biodiversity offsets and what problems we are facing. Finally, drivers and processes of the process of introducing UK biodiversity offsets program is described and analyzed using the theory of institutional change.

Acknowledging some differences even within programs of the same biodiversity offsets types, the analysis shows three distinct types of biodiversity offsets and in all the three shows variations in their governance structures. These are: compensation, one-off offsets, and habitat banking. Interaction for offsetting in the compensation and one-off offsets takes place between landowners/developers and government bodies (protection authorities and regulators) while habitat banking shows the characteristics of a true market in which multiple buyers and seller interaction via trade with the help of traders.

The arguments that support biodiversity offsets includes that the system can overcome the antagonistic nature of development and conservation, possibility to bring about measurable conservation outcome in the form of additionality and the business opportunities it may create by its potential in converting liabilities into asset to land owners. Arguments of opposition include, inability to measure complex nature by reducing into single credit and debit, the uncertainties associated with allowing damage believing in offsetting on another site or in the future, time lags between damage and offsets start giving ecosystem service and loss of social benefits.

In the UK case, the need for biodiversity offsets come both from the private sector and the public. A private company, the Environment Bank, is acting as broker in testing the feasibility of biodiversity offsets in the UK. The government through the department for environment and rural affairs (Defra) is actively engaged in piloting the offsets and undertaking consultation with stakeholders. On the other side, environmental groups such as the Friend of the Earth UK, Save Our Wood UK are campaigning against the introduction of

biodiversity offsets in the country. The UK is piloting biodiversity offsets and final decisions whether the system will be formally adopted or not will be known in the summer 2014.

In general, biodiversity offsets have short history. So far little is documented concerning the effects of this strategy. Hence, it is premature to make any firm evaluations regarding how they can contribute to halt biodiversity loss.

Table of contents

1. Introduction	1
1.1. Problem statement.....	2
1.2. Research questions.....	3
1.3. Structure of the paper.....	3
2. Background	4
2.1. Changes in the Earth-system.....	4
2.2. The rate of biodiversity loss.....	5
2.3. Biodiversity offsets	7
2.4. Habitat banking /conservation banking.....	11
2.5. Challenges of biodiversity offsets.....	11
2.6. The history of biodiversity offsets/habitat banking	13
3. Theory of governance structure	15
3.1. Defining governance	15
3.2. Actors.....	17
3.3. Institutions.....	19
3.3.1. Defining institutions.....	19
3.3.2. The role institutions play.....	21
3.3.2.1. Rights and transaction.....	21
3.3.2.2. Rationality, motivations, and the implications for policy	23
3.3.3. Institutional change	24
4. Research methods	25
4.1. Data collection	25
4.2. Types of data.....	25
4.3. Handling of data.....	26
4.4. Data analysis and presentation of findings.....	26
4.5. Research ethics.....	27
5. Analysis and discussions	28
5.1. General features of biodiversity offsets programs	28
5.2. Basic principles of biodiversity offsets	29
5.3. Governances structure.....	31
5.3.1. Actors and their role in biodiversity offsets.....	31
5.3.1.1. The state as an actor	31
5.3.1.2. The roles of the private sector:.....	32

5.3.2. Institutions and biodiversity offsets	32
5.3.2.1. Formal institutions	33
5.3.2.2. Informal institutions	34
5.3.3. Types of biodiversity offsets	35
5.3.3.1. Compensation fund	39
5.3.3.2. One-off offsets	41
5.3.3.3. Banking	42
5.4. Arguments for and against biodiversity offsets	45
5.4.1. Arguments for biodiversity offsets	45
5.4.1.1. Coupling economic growth and conservation of biodiversity	45
5.4.1.2. Measurable conservation outcomes	46
5.4.1.3. Contribute to resilience of wide ecosystem function	46
5.4.1.4. Investment opportunities in biodiversity offsets.	47
5.4.2. Arguments against biodiversity offsets	48
5.4.2.1. Methodological problems and like –for –like issue	49
5.4.2.2. Practical challenge: license to trash	50
5.5. Biodiversity offsets in the UK: institutional change perspective	54
5.5.1. The need for biodiversity offsets.....	54
5.5.2. Institutionalizing process: actors and their role	55
5.5.2.1. Political entrepreneurs’ role	57
5.5.2.2. The role of the government (Defra)	57
5.5.3. The position of environmental groups	61
6. Conclusions	64
References	67
Appendix 1: List of biodiversity offset programs	73
Appedex 2: List of people contacted	82

List of tables

<i>Table 1: Current trend of the first three Earth-systemboundaries</i>	5
<i>Table 2: Research questions, theory used and sources from which information taken</i>	27
<i>Table 3: formal institutions and their role in producing of biodiversity offsets programs</i>	34
<i>Table 4: Types and number of biodiversity offsets programs in the different continents</i>	37
<i>Table 5: Characteristics of biodiversity offsets programs</i>	38
<i>Table 6: Actors and their role in the US compensatory mitigation banking</i>	43
<i>Table 7: Argument that support implementation of biodiversity offsets</i>	48
<i>Table 8: summaries of main arguments against biodiversity offsets</i>	52
<i>Table 9: Actor and the roles played in the process of developing biodiversity offsets in UK</i>	56
<i>Table 10: The pilot metric developed by Defra</i>	60
<i>Table 11: The two positions on the institutionalizing biodiversity offsets in the UK.</i>	63

List of figures

<i>Figure 1: The mitigation hierarchy.</i>	8
<i>Figure 2: The interaction of actors and institutions as the produce governance.</i>	16
<i>Figure 3: Global distribution of biodiversity offsets programs</i>	29
<i>Figure 4: Categorizing biodiversity offsets programs</i>	36
<i>Figure 5: Actors and roles played in compensation.</i>	40
<i>Figure 6: Actors' interaction in the US aquatic compensatory mitigation</i>	44
<i>Figure 7: uncertainty, time lag and measurability axis</i>	51
<i>Figure 8: The institutionalizing processes of biodiversity offsets in the UK: .</i>	56

Abbreviations

BBOP	Business and Biodiversity Offsets Program
CBD	Convention on Biological Diversity
CIC	Community Interest Constitute
Defra	Department for environment, Food, and Rural Affairs
EAC	Environmental Audit Committee (EAC)
EPA	Environmental Protection Agency
ESA	Endangered Species Act
GDP	Gross Domestic Product
LRA	local Regulatory Agencies
MB	Mitigation Banker
MEA	Millennium Ecosystem Assessment
MHHC	Manitoba Habitat Heritage Corporation
MITA	Manitoba's Infrastructure and Transportation Agency
PES	Payment for Ecosystem Services
RVMC	Regional vegetation management code
SSSI	Sites of Special Scientific interest.
TEEB	The Economics of Ecosystem & Biodiversity
USACE	US Army Corps of Engineers
WFH	waterfowl habitat

1. Introduction

Biodiversity is part of the resources and process necessary for human-wellbeing because it underpins the ecosystem services which has a key role in the supply of clean water, food, fuel climate regulation and recreation (MEA, 2005). However, loss of biodiversity is challenges the sustainability of the above mentioned services to mankind (Rockström et al., 2009). According to Rockström et al. (2009), the rate of biodiversity loss is the most alarming of all the changes in the earth-systems (see section 2.1). They warn, if the rate of change continues as it is today, safe operation of the Earth-system for living things will be questioned.

Reduced habitat is one of the main factors contributing to rate of biodiversity loss (CBD, 2010). Habitat loss is associated with economic growth (Briggs, Hill, & Gillespie, 2009); Quétier and Lavorel (2011); (Quintero & Mathur, 2011). It has been very easy for municipalities to give away land for the development of shopping malls, golf course, large homes, local airports, and mining projects (McCauley, Jenkins, & Quintana-Ascencio, 2013). However, researchers are warning that development in the long run can suffer from loss of ecosystem functions (Bergseng & Vatn, 2009; Kettunen, Vakrou, & Wittmer, 2011; Maron et al., 2012; SCBD, 2006). The argument for this is, natural capital is the foundation for gross domestic product of countries (GDP), and therefore, development goes hand in hand with ecosystem functions (Kettunen et al. 2011).

With the current biodiversity conservation policies governments have failed in halting loss of biodiversity (CBD, 2010). According to the TEEB (2010), the biggest challenge in environmental governance, especially in industrialized countries is over-regulation by rigid bureaucracies, sectoral fragmentation and a prevailing dominance of economic over environmental considerations. Therefore, the ineffectiveness of the current biodiversity conservation mechanisms to halt the loss of biodiversity is pressing governments to search for alternatives (TEEB, 2010). As an alternative some economists proposing the market as a solution (Coase, 1960; TEEB, 2010). Biodiversity offsets are one of the suggested solutions. Therefore with the involvement of market as a conservation tool non- state actors get the chances of formulating conservation policies (Cashore, 2002).

Biodiversity offsetting is one of the suggested market like solution to halt the loss of biodiversity due to habitat loss (Madsen, Carroll, & Moore Brands, 2010; Ten Kate, Josh Bishop, & Bayon, 2004). According to proponents, people who offsets are emerging to

correct the lack of efficient and effective biodiversity conservation policies both in developing and developed countries (CBD, 2010). Many, Briggs et al. (2009); Crowe and Ten-Kate (2010); Madsen, Carroll, and Moore Brands (2010); Madsen Becca, Carroll Natheneil, and Kelly (2011); Ten Kate, Josh Bishop, and Bayon (2004) believe, when development is sought despite its detrimental impact to biodiversity, offsetting from created or enhanced biodiversity reserve outside the geographical location of the developed area is an option. According to Crowe and Ten-Kate (2010), offsets can be done in two ways: a) developers themselves can create biodiversity reserves to offsets the unavoidable impact of their development b) by purchasing biodiversity credits from other specialized bodies called habitat banks¹.

1.1. Problem statement

So far knowledge about biodiversity offsets governance structure and its institutionalization process is limited or not well organized. The process of implementing biodiversity offsets as a new policy instrument in countries who accepts and apply as effective biodiversity conservation is not clear. Therefore, the research aims to understand governance structure of biodiversity offsets as a mechanism in delivering the “no net loss” policy objective in biodiversity.

By referencing to the documented the biodiversity offsets programs² and related literatures, the research will analyze on the biodiversity offsets governance structure, arguments for and against and instrument's institutionalization process, by selecting a single case

¹In this research, habitat banks has been considered as sites where biodiversity is restored, established, enhanced and/or preserved for the purpose of generating certified credits that may be sold for compensatory mitigation for impacts to biodiversity.

² Biodiversity offsets Program indicates any law, policy or program that drives biodiversity offsetting, compensation or offset banking for impacts to biodiversity.

1.2. Research questions

Describing and analyzing the governance structure in biodiversity offsets will help to identify the key actors and their role and the institutional setting in which offsets operate.

- What kind of governance structure characterizes biodiversity offsets?

In introducing new ideas, although the degrees and numbers vary, there exist normally divisions. As a result proponents and opponents are created. So happens also with biodiversity offsets. Therefore, the following question will guide in answering the most debatable issues among proponents of biodiversity offsets and those who oppose it.

- What are in general the arguments for and against biodiversity offsetting?

Currently, the UK is in the process of institutionalizing biodiversity offsets. Therefore, to get real-time information regarding the overall processes of introducing biodiversity offsets in the country the following question is designed.

- How is the UK biodiversity offsetting developing?

1.3. Structure of the paper

This paper consists of six chapters. The first chapter, the introduction that begins with the problem of biodiversity conservation and the interesting shift in conservation systems biodiversity offsetting and the objectives of the research reduced down into three research questions. Next, in chapter two some background information on the subject divided on the problem of biodiversity loss, what biodiversity offsets is, and the historical development of biodiversity offsets. In chapter three, I present the theory, in which I base the research – institutional theory and the theory of institutional change. In chapter four the research methods are presented. In chapter five the analysis and discussion of findings are presented. Finally, in chapter six the conclusion that summarizes answers to the three research questions is presented.

2. Background

Biodiversity offsets is highlighted as a strategy in achieving the “no net loss” target (Madsen et al., 2010; Ten Kate et al., 2004). In theory, biodiversity offsets allow damage to biodiversity from development by compensation through providing biodiversity habitat elsewhere. Under this section biodiversity loss (rate of loss and what biodiversity is), biodiversity offsetting, the definition of biodiversity offsets and its historical development will be provided.

2.1. Changes in the Earth-system

During a period, where the geologists call “the Anthropocene³” the planet has undergone many significant changes. According Rockström et al. (2009) the rate of loss in biodiversity is the most alarming as compared to the changes in the other Earth-system components (see table 1). This rapid rate of biodiversity loss is partly due to human actions – mainly as the result of growing demands for food, fresh water, timber, fiber and fuel (MEA, 2005). According to Rockström et al. (2009), safe operation of the Earth-system is continuously challenged by: (i) rate of biodiversity loss – explained by species extinction rate, (ii) climate change – determined by atmospheric carbon dioxide concentration & change in radioactive forcing, (iii) nitrogen cycle measured in the amount of N₂ removed from the atmosphere for human use, (iv) phosphorus cycle as measured the quantity of P flowing into the oceans, (v) stratospheric ozone depletion as a measure in the concentration of the ozone, (vi) ocean acidification given by global mean saturation state of aragonite in surface sea water, (vii) global freshwater use which is a measure of consumption of freshwater by humans in km³ per year, (viii) change in land use usually given by percentage of global land cover converted into cropland. Atmospheric aerosol loading measured in the overall particulate concentration in the atmosphere, and chemical pollution, for example, amount emitted, or concentration of persistent pollutants, heavy metals and nuclear waste believed to have impacts to the safe operation of Earth-system. Rockström et al. (2009) shows, of all the above mentioned Earth-system processes, the first three are in a critical stage to the safe operating space for humanity.

³ The period where human actions becoming the main drivers of environmental changes and is characterized by a growing reliance on fossil fuels and Industrialized forms of agriculture.

Table 1: Current trend of the first three Earth-system boundaries

Earth-system process	Parameters	Proposed boundary	Current status	Pre-industrial value
Rate of biodiversity loss	Extinction rate (number of species per million species per year)	10	>100	0.1–1
Climate change	(Atmospheric carbon dioxide concentration (parts per million by volume)	350	387	280
Nitrogen cycle (part of a boundary with the phosphorus cycle)	Amount of N ₂ removed from the atmosphere for human use (millions of tonnes per year)	35	121	0

Source: Rockström et al. (2009)

As per the data provided by Rockström et al. (2009), the proposed boundaries from biodiversity, climate and nitrogen cycle has already been transgressed. Referring to the above earth – system changes, Biermann (2012) believes that, mankind is the main agent for the changes and therefore has the responsibility of managing his own agency to ensure sustainable development and governance is the final objective.

2.2. The rate of biodiversity loss

Loss of biodiversity is a global phenomenon, and the world has failed to meet its commitment to achieve a significant reduction in the rate of global biodiversity loss by 2010 (CBD, 2010). As it is indicated on the above table, the loss in biodiversity is the second alarming

environmental change of the Anthropocene. The loss of biodiversity is seen by BBOP⁴ as one or more of the following situations:

“(1)reduced area occupied by populations, species and community types, (2) loss of populations and the genetic diversity they contribute to the whole species and (3) reduced abundance (of populations and species) or condition (of communities and ecosystems). The likelihood of any biodiversity component persisting (the persistence probability) in the long term declines with lower abundance and genetic diversity and reduced habitat area.”(BBOP, 2012, pp: 4).

While loss of biodiversity is a naturally occurring process, the process of species extinction is exacerbated by human actions, mainly due to land use change (from natural cover to agricultural land and/or urbanization). This usually happen as a result of economic growth that creates more pressure on species habitats and consequently results in the loss of biodiversity or its fragmentation (Briggs, Hill, & Gillespie, 2009); Quétier and Lavorel (2011); (Quintero & Mathur, 2011; Samuel, Patrick, Ece, Clare, & Heidi, 2011). It is also important to consider that environmental changes are highly interlinked process. This means, loss of biodiversity is affected by climate change, the nitrogen cycle and pollution.

The loss of these interrelated ecosystem functions directly affects the services we get from the ecosystem, which further influence our returns on investments (Kettunen, Vakrou, & Wittmer, 2011). Therefore to continue to enjoy environmental services, pricing biodiversity based on their fully burdened replacement cost to provide economically viable alternatives to the conversion of biodiversity rich areas into another land use forms is needed(Kettunen et al., 2011; TEEB, 2010).

⁴ **BBOP**

The Business and Biodiversity Offsets Program (BBOP) is a project initiated by the Forest Trend, collaboration between some 75 organizations: companies, government agencies, conservation organizations and financial institutions from around the world. Its aim is to develop shared views and experience of best practice on the application of the mitigation_hierarchy, including biodiversity offsets. Drawing on experience of BBOP members and non-members from around the world, and from pilot projects with companies, BBOP has developed principles and the standard on biodiversity offsets, handbooks on offset design and implementation, a number of resource papers and case studies.

2.3. Biodiversity offsets

In managing biodiversity in particular and the ecosystem in general, there has been continuous evolutions in conservation measures. These measures range from regulatory practices – for example, rules and standards, economic measures such as taxes and subsidies (in the form of payment for ecosystem services) and the market based instrument biodiversity offsetting.

Biodiversity offsets is defined as:

“Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development and persisting after appropriate prevention and mitigation measures have been implemented. The goal of biodiversity offsets is to achieve no net loss or preferably a net gain, of biodiversity on the ground with respect to species composition, habitat structure and ecosystem services, including livelihood aspects” (BBOP, 2009, pp: 6)

Madsen et al. (2010) and Ten Kate et al. (2004) argue that biodiversity offsets are designed to compensate the loss of biodiversity as a result of habitat loss due to impacts from development. Impacts can sometimes be reduced substantially at the design stage of the development or operation by the use of different mitigation measures; however, inevitable residual impacts must be compensated to reach the target of no net loss.

The BBOP report stresses that Biodiversity offsets practitioners must bear in mind not to create a situation where “the baby is thrown with bathing water”. The BBOP report suggests; practitioners of biodiversity offsets should build on existing systems rather than trying to replace it. Therefore, what is recommended by the BBOP is to go in harmony with the mitigation hierarchy as illustrated below

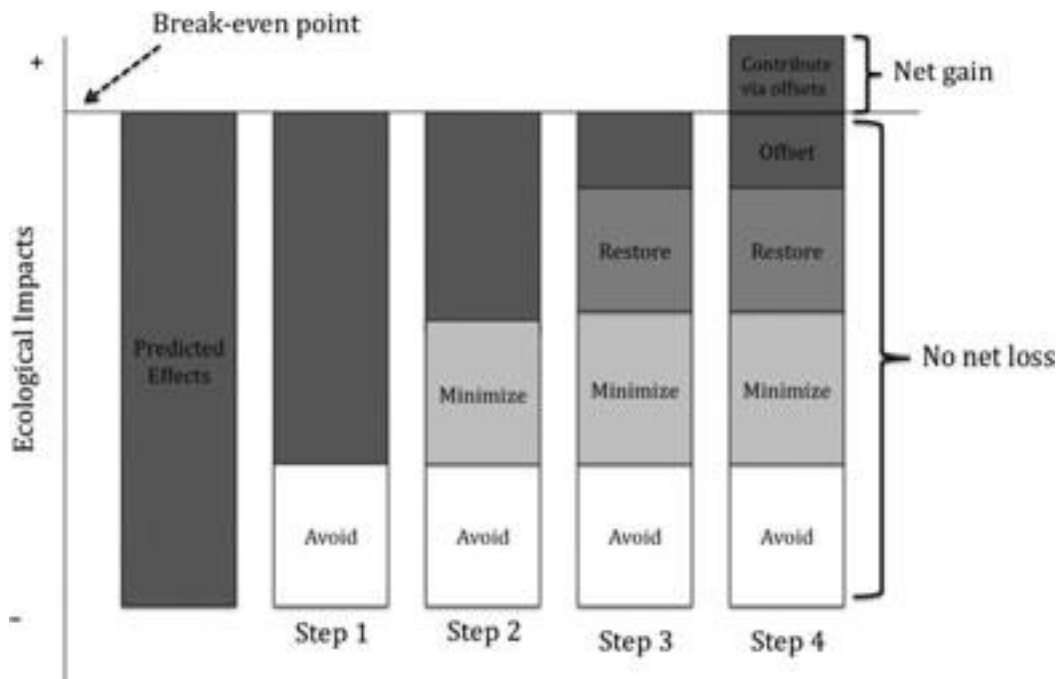


Figure 1: The mitigation hierarchy.

Source: Quintero and Mathur (2011)

According to Madsen et al. (2010); Samuel et al. (2011); Ten Kate et al. (2004) biodiversity offsets is the most suitable instruments available for halting biodiversity loss resulting from habitat loss. The thinking behind offsets, is that if positive and negative impacts on biodiversity can be measured and represented as credits and debits, they are more easily integrated as benefits or costs in economic decision-making (Doswald, Barcellos Harris, Jones, Pilla, & Mulder, 2012)

“Biodiversity offsets are also referred to as biodiversity compensation, environmental compensation, ecological compensation, and net conservation benefits. These terms reflect the fact that in practice there are at least four different types of offsets mechanisms (BBOP 2009). The first are mechanisms to halt or reverse undesirable effects of infrastructure development, such as creating protected areas, establishing corridors and buffer zones, protecting species’ habitats, and alleviating pressure on natural resources by introducing alternative means of income generation or substitute materials. The second type of offsets is agreements with individuals to cede the right to convert land cover for profit. The third type is community-based programs such as compensation packages to local stakeholders, and the fourth is fund transfers from infrastructure projects to biodiversity conservation.(Quintero & Mathur, 2011)

According to Madsen et al. (2010) report, the basis for biodiversity offsetting arises as result of : 1) regulatory compliance - governments simply set allowed impact biodiversity “ a cap” so if developers exceed the limit, then the market determines the cost of offsetting the impact. 2) State-mediated: here governments or non-profit organizations act as buyers of biodiversity reserve by purchasing land for biodiversity conservation activities or do the conservation activities or simply creating payment for biodiversity stewardship. 3) Purely voluntary: driven by ethics, goodwill or business reasons. The voluntary offsetting includes certified biodiversity friendly products, tourism and recreation, donations for biodiversity conservation.

Bayon (2008) has summarized the concept of biodiversity offsets in the box below in simpler terms.

A Fly in the Ointment

Delhi Sands Flower-loving Fly, a rather pretty insect that, like a butterfly, hovers and sips nectar from local flowers. This tiny creature has the distinction of being the first fly—and only the seventeenth insect—to be declared an endangered species in the United States.

According to the U.S. Endangered Species Act (ESA), no individual or entity, public or private, can harm an endangered species – not even a fly – without a permit from the government.

Thus, shortly after this fly was listed as an endangered species, construction of a hospital in San Bernadino county ground to a halt. The hospital had planned to pave over seven acres of occupied fly habitat, but that all of sudden became illegal. The hospital then had to spend \$4 million redrawing its plans, moving its parking lot 250 feet, and making a few other minor changes. All so it wouldn't harm a fly.

How much is a fly worth? Do you judge by what the fly does? With this fly, scientists do not know the answer to that question. They know that pollinators, such as this fly, tend to have important and symbiotic relationships with the plants they feed on. In some cases, without the pollinator the plant cannot reproduce. Perhaps the flower-loving fly plays that role. Or it could be a cornerstone species, without which an entire ecosystem could collapse. Or maybe protecting this fly will protect dozens of other species, some of which may not even have been discovered yet.

E. O. Wilson has written: "I will argue that every scrap of biological diversity is priceless, to be learned and cherished, and never to be surrendered without a struggle."

The state of California, in contrast, has a more moderated view. Having determined that the fly should be protected, it decided to let the market decide what it costs to conserve it. And the market determined that the going rate in California for Delhi-sands fly habitat is currently somewhere between \$100,000 and \$150,000 an acre.

This story is interesting not so much because it is hard to believe that people are buying fly habitat – let alone paying \$150,000 for it – but rather because it forces society to answer that crass and materialistic question: How much is nature really worth? Some would argue that the question should not even be asked. And yet society answers this question "by default" every day. Every time people buy soybeans, for example, they are putting a value on the Amazonian rainforests that were cleared to grow them.

At least in the case of the fly, the price tag is clear, evident, and visible. If a developer wants to pave over fly habitat, it will cost the company (in today's market) as much as \$150,000 an acre. If that were all there was to this story, the concept of putting a price on endangered species would be quite troubling. It implies that someone could pay the price set by the marketplace and then go ahead and destroy the last surviving population of a species.

But that is not what is happening. The \$150,000 paid to pave over the fly's habitat is actually being used to protect or create habitat for that same fly somewhere else. It is, in other words, an "offsets" – not unlike the carbon offsets people are buying to counteract their greenhouse gas emissions. As the money goes into legally and financially protecting the flies forever (at least in theory), in a way it is a market, or at least a market-like mechanism. It puts a value on endangered species and habitat, turning them into marketable assets. It puts a cost on the fly for those who would harm it, and at the same time it creates a value for those who would conserve it. It is this marvelous alchemy – turning cost into value, liability into asset – that may ultimately allow society to preserve biodiversity. But does it work? And, if so, how does it work?

(Ricardo Bayon, 2008, pp 126-127)

2.4. Habitat banking /conservation banking

It is a market based instrument designed to help achieve biodiversity offsets targets more flexibly by creating, enhancing and restoring species for the supply of biodiversity credits (Madsen et al., 2010; Mead, 2008). Madsen et al. (2010), argues habitat banks can be created and stored without predicted links to the debits they compensate and the reserve can be stored over time as conservation banks, habitat banks and species bank until demanded by developers (Madsen et al., 2010). The common practice is that organizations create the so-called habitat bank contract with local authorities for defined time frame (e.g., 10 years) agreement in creating biodiversity reserve (Crowe & Ten-Kate, 2010). Then, the created biodiversity reserve is sold to developers as credits to offsets all unavoidable environmental impact of development over the period of the agreement (Briggs et al., 2009; Crowe & Ten-Kate, 2010; Kiesecker et al., 2009; Womble & Doyle, 2012). The ratios to be marketed depends on the quality of the habitat and work undertaken (Ten Kate et al., 2004).

The market of biodiversity was a growing interest phenomenon in the world with 86,000 hectares of land under some sort of conservation management or permanent legal protection (Madsen Becca, Carroll Natheneil, & Kelly, 2011). According to Madsen Becca et al. (2011) the global annual market size is \$2.4-\$4 billion, although about 80% of them are not transparent enough to estimate their market size.

2.5. Challenges of biodiversity offsets

Market and market like institutions are to date available options to curb biodiversity loss (Bayon & Jenkins, 2010; Madsen et al., 2010; Ten Kate et al., 2004). In doing so, commoditizing the historically invisible value of biodiversity is the prerequisite to exchange of biodiversity credits between sellers and buyers. However, making biodiversity as a fundamental part of our economic system is challenging (Maron et al., 2012; TEEB, 2011, 2010). The most important question is how created banks can ensure conservation of a species with the potential benefits.

According the report from TEEB (2010) commoditization help shift biodiversity status from nature to “natural capital” to suit quantifying biodiversity loss in monetary value. But this is not as easy as one may think because there exists a complex interdependence among biodiversity function and the services to consumers direct measurement of value of biodiversity is challenging. However, to showing the public and stakeholders that benefits

outweigh the costs, valuation ecosystem service is required, but valuation of ecosystem services is not the mandate of this research.

At the same time the idea of offsetting biodiversity from created reserve called habitat banking has been challenged for not creating exact match of biodiversity structure and function to that of the natural biodiversity intended to offset (Maron et al., 2012; Shelly, 2010). The Media has started writing on the critiques of biodiversity offsets in bold letters. For example, Johnston (2013) in *The Independent* on December 3, 2013 published a news article about biodiversity offsets titled 'Licence to trash nature' which clearly shows the oppositions of some environmental groups.

As a response to the like-for-like criticism, adherents of habitat banking believe, the already well established knowledge about the relationship between plants and geology, hydrology and between animals and vegetation will make it easy to create a habitat fairly representative of the natural biodiversity (Gardner et al, 1997, Hopkins 2003, Hous & Feller 1983, Louseley 1976, Morris 1998, Webb 1989) cited in (Briggs et al., 2009). An alternative habitat banking adherents propose is habitat bank sites must aim to create a habitat of greater size than the area affected by development. For example, the US environmental protection agency in 1992 set the ratios to be 1:2 for restored, 1:3 created, 1:4 enhanced and 1:10 preserved (Dennison & Schmid 1997) cited in (Briggs et al., 2009). Habitat banking as a tool for offsetting programs can achieve a “no-net loss” or “net gain” of biodiversity to an area impacted by development (Adams, Pressey, & Naidoo, 2010; Madsen Becca et al., 2011; Shelly, 2010)

2.6. The history of biodiversity offsets/habitat banking

Biodiversity offsets is believed to have its base in the US Wetland mitigation banking system (Ten Kate et al., 2004). The United States Army Corps of Engineers (USACE) administers the system under the Environmental Protection Agency (EPA). The concept of the mitigation banking was introduced in 1970 as enactment of the US Clean Water Act that provides protection of wetland and water of the US (Mead, 2008). According to Bayon and Jenkins (2010), the USACE began creating market by providing wetland mitigation banks in 1980. Traditionally mitigation was done on project – by- project basis which has resulted in numerous small mitigation sites near development areas. In a similar way offsetting for endangered or threatened species which is called conservation banking was practiced (Mead, 2008).

In the US, legal requirement such as the Endangered Species Act (ESA) of the 1973 - a law that requires minimizing or mitigating unavoidable impacts to listed species opened new markets to biodiversity. According Mead (2008) such a measure pushed the introduction of off -site mitigation that occurs through conservation banking in the US.

In a similar way, the Australian offsets policies emerged as a response to the Environmental protection and biodiversity Act of 1990. The main initiative of the Australian offsets programs was to offset the clearance of native vegetation. The system is getting strong support from the federal government and is rapidly developing. In Australia biodiversity offsets is developing into new market. The BioBanking, a market based offsets introduced by the New South Wales State is currently providing species credits.

In Europe, conservation of biodiversity is in general evolving slowly (Ledoux, Crooks, Jordan, & Kerry Turner, 2000). The main foundations for biodiversity conservation are implementation or consistency to international treaties. However, several approaches to protect biodiversity have been developing. These include the 1979 wild birds directive ,with main focus of protecting species and the 1992 habitat directive that incorporate habitat type to the species protection objective of the of the wild birds directive(Ledoux et al., 2000). This directive main principle is conservation of biodiversity under protected areas with detailed implementation criteria at national level which creating management conflicts due to rigid interpretation (Theobald, Miller, & Hobbs, 1997). According to

Through the 1994 conservation UK has already changed the habitat directive into British law but the rigid interpretation of the habitat directive is criticized “wait and see” policy hindering economic development and don’t appreciate the dynamic nature of ecosystems. This problem is recognized by the UK, therefore as a solution to this problem the UK is currently experimenting biodiversity offset as policy instrument.

3. Theory of governance structure

“Due to the forms and size of our activities, we increasingly shape the possibilities for people even far away from where we live and for people not yet born”

Vatn (2005: 1)

Resource management problems are partly a result of the inability the governance structure to fit to the resource regimes in place (Bergseng & Vatn, 2009; Vatn, 2005).

The process of institutionalizing environmental governance (biodiversity in our case) demand the interaction of actors and institutions (Pahl-Wostl, 2009; Vatn, 2005). By taking governance structure as a backdrop, empirical analysis of the biodiversity offsets programs that will be analyzed to characterize biodiversity offsets governance structure. The analysis will focus on the interactions between the main actors and institutions involved in producing biodiversity offsets policy instrument. The main task of policy instrument is to regulate the use, conservation, effective management of a resource. Following, the theoretical foundations of such coordination and its relevant concepts will be presented.

Governance takes into account the different actors and networks that help formulate and implement environmental policy and/or policy instruments (Pahl-Wostl, 2009)

3.1. Defining governance

The starting point in understanding the concept of environmental governance is to refer to the definitions given by people who are involved in the environmental governance discourse.

Paavola (2007, pp: 94) define environmental governance as *“the establishment, reaffirmation or change of institutions to resolve conflicts over environmental resources. It also explains why the choice of these institutions is a matter of social justice rather than of efficiency”*. In his definition Paavola clearly operationalizes that conflicts referred to the “conflict of interest between actors”, but not the overall conflicts that take place in connection to resource access.

Lemos and Agrawal (2006, pp: 298) also define governance as a “set of regulatory processes, mechanisms and organizations through which political actors’ impudence environmental actions and results”. According to them, market- and agent-focused instruments are getting popularity in today’s environmental governance. It is also sometimes called incentives-based mechanisms environmental governance.

Paavola (2007) pointed out, the difficulties in finding a commonly agreed definitions of governance is considered to be the greatest obstacle to its extension. However, Pahl-Wostl (2009); Vatn (2005, 2011) see the concept of governance as an interaction between actors and institutions. This concept of governance will be the basis for the analysis of biodiversity offsets governance structure.

The following illustration by Pahl-Wostl (2009) depicts the interaction of actors and institutions and the type of governance structure as an outcome of the interaction.

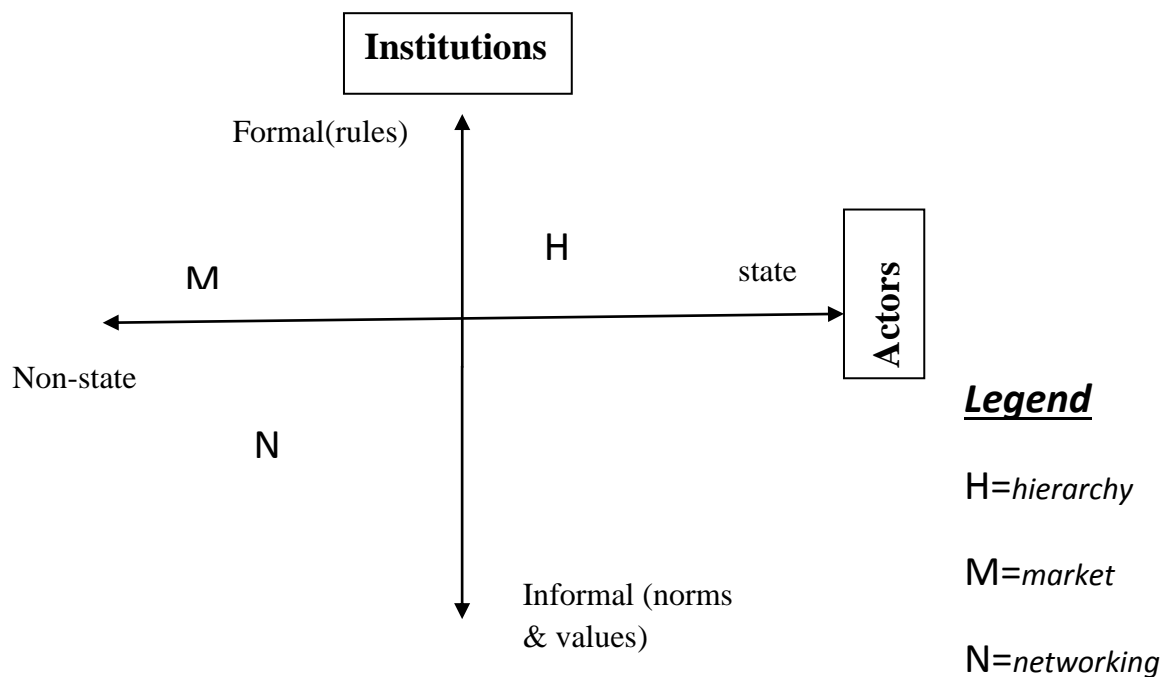


Figure 2: The interaction of actors and institutions as the produce governance.

Source: based on Pahl-Wostl (2009)

Based on the above illustration, the interaction between the actors and institutions produces three types of governance structure. According to Pahl-Wostl (2009), if the interaction is dominantly takes place between the state and formal institutions the resulting governance structure is hierarchal - command and control becomes the main interaction rule. But if the interaction is between the non-state actors and formal rules the resulting governance structure is trade via market. Similarly, if the dominant interaction takes place between the non-state actors and the informal institutions, the resulting governance structure is networking – best explained a reciprocal.

3.2. Actors

An actor is an important element in governance. An actor can be an individual, groups, organizations, family, firm, or the state.

According to Scott, Meyer, and associates (1994) defined actors as elements of the social system such as interest groups, organizations and associations.

Pamela S. Tolbert and Zucker (1999) identified two distinct models of social actors who rather they see it also as a two ends of a continuum in socialization processes.

The first one is what Pamela S. Tolbert and Zucker (1999) named as the rational actor – these types of actors are individuals who act based on calculative cost and benefit process to maximize their personal utility. This is in accordance with the fundamental neoclassical economic theory.

The second are the institutional actor: these actors who accept and follow social norms unquestioningly when choose to act on something. This thinking coincides to the social constructive rationality theory of classical institutional economics. Therefore, I find it important to define what institutions are and describe what institutions do in a given social system.

Actors are getting more focus in sociological discourse. According to Scott et al. (1994) this is because, the word actor explain social element far beyond an individual. The shift from individual to actor as a change agent is based on the argument that says, social processes and social change must at least partly result from the participation of many actors, than a single power like the state. This helps to reduce the expected resistance of to the newly developing regulations i, e. structured groups such as organizations, interest groups (Scott et al., 1994). In a such organized bodies, according to North (1990); Scott et al. (1994) socialization is reflected in the structures that hold the actors. Therefore, an organization that itself considered as an actor in a social system, according to Scott et al. (1994) have the potential to channel interests through the structures in place. Then the individual free-floating behavior become dependent of the existing structures (Scott et al., 1994). This thinking is also explained in a similar way by both Vatn (2005) and (North, 1990) in explaining how institutions influence behavior.

North (1990) showed, the rise of organized bodies, such organizations in his example are results of the opportunity created by institutions. North (1990) concluded, both what type of

organizations that come into existence and how they evolve are fundamentally influenced by institutional structure. In return, organizations also influence how institutional framework evolves (North, 1990).

Theoretically, the role of non- state actors (such as the private sector, the market and civil societies) is acknowledged in the process of the institutional formulation for the governance of resources. In governing the environment coalition of many actors is needed at all levels (Biermann, 2012). More consultative governance structure provides opportunities in creating networks of states, civil societies and the private sector in achieving common interest goals (Bergsens & Vatn, 2009; Vatn, 2011). It is more as co-management which is strengthened by partnership between and among private-public, civil society – state, private – state or civil-society-private without absolute domination of one over the other (Cavanagh, 2012; Maria Carmen Lemos & Agrawal, 2006).

State and non – state actors are crucial in governance of resources. These actors contribute greatly to the designing of institutions that in return govern actors behavior (Pahl-Wostl, 2009). Therefore, involving actors in institutionalizing environmental governance help effectiveness of institutions by affecting both the formal and informal institutions. In the case of informal, it is due the increased compliance help the compatibility of the formal and informal institutions. And the result becomes effective institutional setting. Finally Pahl-Wostl (2009) concludes to have an appropriate balance between the formal and informal institutions is necessary in the formulation of institution that can effectively govern natural resources.

However, there are also evidences that governments are more effective in managing confined ecosystems such as river basin, lakes (Biermann, 2012). Paavola (2007) suggests the state should be seen as one of the other actors for collective management of resources than acting as the only actor to monopoly the governance. According Paavola (2007) even in a more consultative system in which local actors take decisions of their own, governments involve in the form of self-governance and plays a crucial role in distributing power among the different actors and regulating interaction.

3.3. Institutions

Different scholars who may be influenced by their scholarly inclination have defined institution in a different ways. Some look at institutions as entities that influence individuals' behavior, while others look the other way round, as individuals' behaviors influences the type of institutions. This way or the other conceptual tiers are needed to clarify the environmental governance as Ostrom (2008) noted that scientific concepts are part of complex, linguistic, ontology in which one concept is a sub-concept of another which is a sub-concept of still another . Given such complexity, keeping analysis straight forward is a challenging task.

3.3.1. Defining institutions

Vatn (2005: 60) defined institutions as *conventions, norms, and formally sanctioned rules of society. They provide expectations, stability and meanings essentially to human existence and coordinations. Institutions regularize life, support values and produce and protect interests*

Although, the analysis is going to base on the above definition, to have a balanced view of the concept, views of institutions from another other scholars with different school of thought is important.

He defined institutions as external constraints that shape human interaction. In explaining, how the human interaction is constrained by institution. North (1990)

North, who is an adherent in the theory new institutional economy, gives more value to the cognitive way of individual thought. In his explanations, if individual are not constrained by the institutions, they normal act based on calculative basis, without giving much attention to the norms and values of the social system. North's explanation of institutions and their role in coordinating individual interaction is, just to act as a constraint. institutions in two ways. The first is, institutions prohibit individuals from doing certain actions. And the second is, institutions only set conditions that legitimate individuals to undertake certain activities. The rule of the game in a competitive sport is the analogous used by North to clarify institutions constraints role to human interaction. In his analogous, the role of the rules is to define the way the game is played. North believes that individuals act in a calculative manner to satisfy their individual utility. This supports the individual rationality theory of socialization. From North's position, he understands institutions as humanly devised constraints to the free-floating individual calculative behavior.

Both Vatn and North agree on the role institutions play in creating coordination and stability when individuals are interacting.

It has to be clear that institutions do not represent organizations or physical structures. Pahl-Wostl (2009) categorize institutions into two groups --- formal and informal. The formal one includes codified regulations, such as written policy frameworks, and formal rules that we normally find them in government documents. The informal one is those cultural cognitive norms that direct actions as right or wrong. According to Pahl-Wostl (2009) effectiveness of the institutions in governing resources depend on the compatibility of the so called formal and informal institutions and the type of actors involved. In the worst case, according to Pahl-Wostl (2009) institutions result in an ineffective governance of resources, due to the incompatibility of the formal and informal institutions in designing policies. For example, the incompatibility between formal and informal institutions can result in corruption. In a similar case if the formal and informal institutions are compatible, results are effective resource governance.

Going more into the details to understand the roles of institutions it is more important to see how institutions are conceptualized. Vatn (2005) put institutions as sets of concepts like convention, norms and formal rules. In his split into conventions, norms and formal rules Vatn (2005) tried to explain as each of these components supports different motivations for an individual to choose to act. Vatn (2005) supported his argument, by providing examples of each. As an example to the convention segment of the institution is that, individuals choose to act, because they reached a point of consensus to do so. In his example, Vatn (2005) put the use of money as a convention to simplify transactions. He also endorsed the use of language provided by Berger and Luckmann as a basic convention among individuals. In the second element, which is the norm, Vatn (2005) argues, individuals sometimes choose to do things just to respect the perceived value of the society, community or group they live in. also supported by (Pamela S. Tolbert & Zucker, 1999; Scott et al., 1994). By doing so, they show their conformity to the recognized standard behavior in their near social environment; i.e., they do it only to avoid deviations from what the majority in the community, society or organization are doing, even to the extreme, against their personal interest/will. Vatn (2005) third concept of an institution is the formal rules; here according to Vatn, individuals give a portion of their right to a third party, for example, the state to legitimate and protect their interest. Most of the time, if individuals fail to come into conventions or start deviating from respecting the values in the society or community, then usually the need for a third party

follows – the rule of law, which is usually provided by institutions. Although there exist different positions on how of institutions influence individuals like what (North, 1989) see institutions as humanly devised constraint or in what so ever form (as conventions, norms or formal rules) an institution appear. institutions main task is always about to bring human coordination, in addition, Vatn also indicated that there are situations in which institutions can contribute to conflict too - by taking side in conflict. (Vatn, 2005),

The humanly induced institutions like regulations and the market are frequently used in the governance of the environment (A. Vatn, 2005). According (A. Vatn, 2005)the basis for such distinctions are property rights (i.e. private, common, state, no property), rationality, and transaction costs. Although no completely clear boundary as to say that property right match a specific institutional setting, what is observed in most of the cases is that the market as a regime can best solve the problem of resource management characterized by private property regimes ; Williamson, 1981). At the same time, the market has the potential to cultivate individual rationality (A. Vatn, 2005). Due the nature markets allow individuals to freely exchange, the cost of the transaction which the factor of negotiation, information search, contracting, enforcing contracts, delineating and protecting their property rights. The conclusions made by A. Vatn (2005) shows that resource regimes — private, common pool, state and no property can be dealt with market, community/interactive consultation, regulation and open access respectively.

3.3.2. The role institutions play

When individuals/actors are interacting according Vatn (2005) actors are influenced in three different ways by the institutions setting in which they are part. The first is that the role institutions play in affecting access resources by influencing rights and structuring the power of actors. The secondly by influencing actors motivation – this results from the type of rationality institutions cultivate – for example the market as an institutions dominantly support individual rationality. And thirdly institutions influences the cost of transacting by solving the problem of coordination.

3.3.2.1. *Rights and transaction*

In common sense; it is understood one can't legally exchange a good or service if he or she doesn't have ownership of it. But when we can say that we have full ownership of a good or a service? This can be a deep philosophical question. what we can definitely know about the attempts that try to legally define ownership even in the ten commandment in the old

testament of the Bible, in exodus 22:1-15 (Allen, 1999). What is more important at this level is the role institutions play in influencing property rights and their institutional responsibilities to provide effective, transparent and accountable enforcement of individuals' or groups' rights. They can include both ownership and how institutions can grant the owner the right to benefit, but also prohibit cost shifting (Vatn, 2005).

Finding the best fitting solution to the characteristic of a resource at hand was the biggest challenge in producing appropriate policies instrument (Vatn, 2005). According to Vatn (2005) the characteristics of the resource which best explained by the type of resource regime such as private, common, public property affects the type of policy we choice. property rights demarcating difficulties due to the size of transaction cost involved (which is directly related to the productive nature of the good or service) (Vatn, 2005) and managing externalities determines the way we categorize property regimes as private, common and public. Finally (Vatn, 2005) concludes identifying the property regime help policy makers in choosing institutional structure that support the rationality and type of interaction consistent to the resource management problem.

In addition to what a good or service contains, how it is demarcated is also an important prerequisite for an effective interaction (Vatn, 2005). We don't normally have full control over the attributes of a service or a good and the characteristics of the performance of the agent during an exchange. So, we must devote some of our resources to collect enough information, for example, to measure or monitor the attribute of a particular good or service to be exchanged. Furthermore, if two parties to engage themselves in exchange, the exchanging parties need to secure their property rights and securing property right is a costly process. The property owner must be in a position to pay for enforcing his /her property right to a point at which the marginal cost of enforcing is equal to additional marginal benefits from enforcing (North, 1990; Williamson, 1981). According to North (1990) enforcing property rights can be done in two ways: by the second-party retaliation and societal sanction. Vatn (2005) expressed the second option as a situation the property owner's hand over part of his/her rights to a third party - for example the state in return to get his/her property rights enforced. It is in this part of enforcement, institutions play a role both in creating a structure that help in enforcing property rights and influence transaction cost. Without being constrained by institutions according to North (1990), it becomes easy for a party characterized by self-interested behavior to defect in order to maximize gains or avoid additional cost reflected in the transaction cost.

In an attempt to depict the relationship between rights and transaction costs during and exchange Vatn (2005), show how the exchange between parties is controlled by the rights the exchanging parts hold using an illustration of a polluter /victim.

In his illustration, who is holding the right is the most important factor dictating transactions. Does the polluter have the right to pollute or does the victim have the right to be protected from pollution? If the existing institutional setting gives the polluter the right to pollute, the victim in principle must pay the polluter to stop polluting if he/she wants to be protected from pollution. Another option for the victim could be enforcing his/her right of being protected from pollution, but the process will incur a cost to the victim – what we call the transaction cost. If the victim manages to enforce his /her right of protection from pollution at costs lower than the damage cost he/ she may get free from pollution, then the victim is about to bring institutional change. But if the cost of enforcing his/her right is greater than the damage cost, the victim will not bring an institutional change and the right of the polluter is maintained.

3.3.2.2. Rationality, motivations, and the implications for policy

From policy makers point of view, there is always a need to gain a better understanding of everyday consumption practices, which usually shaped by the individuals' motivation (Cashore, 2002; Vatn, 2005). As also emphasized by (North, 1990) institutions reduce actors' uncertainty when interacting by structuring access and power

According to classical institutional theory, that what is rational is defined by the social setting such as marketplace, family or policy (Vatn, 2005). This means personal motivations are continuously regulated by the institutional structure in place. According this tradition, individual's ability to interact smoothly affects both the performance and survival of institutions. And interactions are usually influenced by the right the interacting parties hold and the cost of interaction, which is also regulated by the institutional setting.

According to Vatn (2005), institutions help understand people's motivations. This is usually facilitated by the role institutions play to motivate actors by defining expected or respected acts. According to him, institutions give stabilizing roles, for the simple reason that institutions are both social constructs, and they are built by people who themselves are part of the social setting. Based on this theoretical learning, the necessities to create and change institutions become a need in order to achieve accepted behavioral change.

In most of the cases; there are many ways of doing the same thing, what Vatn (2005) called the problem of social coordination. To reveal this problem Vatn showed the different ways of greeting people resulted from culture and age differences, as an example. In such situations, Vatn believes institutions can play significant role in resolving the inherent problems of human coordination by guiding individuals to follow acceptable behavior which is easily understandable by all. According to Vatn (2005) it is not always institutions coordinate interaction, there is situations where institutions contribute to conflict by taking side of one party.

3.3.3. Institutional change

In the realm of environmental problems, According Vatn (2005) institutions must continuously be created as the response to continuously emerging problems. The theoretical understanding of institutional change is differently explained by different scholar. This is usually based on the scholarly inclination of the scholar about the concepts of institution. North (1990) for example believes, to account emergent problems, poorly performing institutions that threatened for survival of economies, are forced to weeded out, where as successful ones survive. According (North, 1990) an adherent of the new institutional economics, two main drivers of institutional change are an increasing in returns and the imperfect markets. Here, the first case is resulted from economics of scale while the second is best explained by the size of transaction cost. As per North (1990), the newly created institutions evolve gradually in most of the cases. According Vatn (2005), who follow the classical institutional economics school, institutional change take place either as a result of purposeful actions such state regulative what Vatn term as “planned” or simply results from an emergent, self-organized initiatives termed by Vatn as “spontaneous” institutional changes.

What can be concluded form both of the above explanation are that institutional change can take place to either as a result of purposeful actions driven by the need in motivating behavior change towards achieving desired goals, or spontaneously to respond failure or the combination of the two.

4. Research methods

In this section, I will present data sources and methods of data collection, how I handle the data, and how the data is analyzed.

4.1. Data collection

This research is predominately a desktop based research. The starting point was the ecosystem marketplace web page and reports of the BBOP. The reading the report gave me access to the biodiversity offset database at speciebanking.co. According Carroll (2014, personal communication) the database was last updated in mid 2013. Although most part of the data were text based, selected contacts with people actively working in the area was also done using Skype video calls and emails. Participating in biodiversity offset related webinars were another important methods utilized. The webinar was particularly important in understanding complex concepts, because this opened me opportunities to ask questions to experts. The information from the webinars was used to triangulate secondary data from documents, homepages and journal articles.

4.2. Types of data

This research uses all biodiversity offsets programs that are registered in the ecosystem market place database. Therefore it is a population study. The UK biodiversity offsets program was purposely selected to reflect institutional change theory. This is because; the UK is currently in the process of institutionalizing biodiversity offsets as a policy instrument. Both primary and secondary data was used in answering research question one and three. But data used in answering research question two used only secondary data.

The primary data: the sources includes the web pages of ecosystem marketplace; Defra (department for environment, food and rural affairs), environmental group web pages and blogs. web pages of organization and government documents. Directory of all biodiversity offsets program worldwide was access from the BBOP web page www.speciebanking.no. These biodiversity offsets programs were grouped by region to understand world wide distributions.

Secondary data including biodiversity offsets reports, journal articles. The tracking of the journal article was done be by searching in BBIS (NMBU online database) and Google scholar.

4.3. Handling of data

Sorting of the data: First I separated all sources by type as web pages, reports, government documents, journal articles and books. Then, I tried to sort each source according to relevance to the research question, the research questions.

In the case of journal articles, which were most relevant to answer the second research question, I started grouping them into two categories, as articles written in favor of biodiversity offsets and those criticize the biodiversity offsets. When reviewing the documents, I have used different marker colors for the different arguments. The marking was also done in the electronic documents in the same way.

4.4. Data analysis and presentation of findings

Theory governance structure is theoretical foundation of this research. The research has three research questions. Although related in some way, the data used to answer the three questions was different. Therefore, data handling was done based on the type of research question.

The first research question deals with government structure in biodiversity offsets. Most of the data used to address this research question was primary data from the biodiversity offsets directory provided by the ecosystem marketplace database at speciebanking.com. However, journal articles, reports of offsets programs and personal communication were also used to support the information extracted from the database.

The second research question deals about the argument for biodiversity offsets as policy instrument to achieve no net loss target in biodiversity. In this part, scientific journals articles are extensively used. But books, web pages and reports are also consulted in addition.

The third research question deals with the case of introducing biodiversity offsets in the UK with an objective of investigating the institutionalizing process. This research question is a case study type. Therefore, specific information that best describe the case was accessed through Defra web page, and reports and personal communication from the authorities testing biodiversity offsets program in the UK. Web pages to environmental groups such as the Friends of the Earth UK and Save Our Wood were also extensively used.

Presentation of findings: Text, chart, illustrations, tables and historical timelines are among the common methods employed to present findings. For research question one, i.e., to answer the governance structure that best characterize biodiversity offsets. The data was

analyzed by using the theory of governance structure. Specifically after Pahl-Wostl (2009) which see governance as an outcome of the interaction between institutions and actors which is also supported by (Vatn, 2005; 2011).

The research methods used in the research is summarized in the following table.

Table 2: Research questions, theory used and sources from which information taken

Research question	Theory used for analysis	Source of data
What kind of governance structure characterizes biodiversity offsets?	Governance structure (Institutions and actors interaction)	<ul style="list-style-type: none"> • Books • Journal articles • Speciesbanking.com • Ecosystem marketplace home page • Personal communication
What are in general the arguments for and against biodiversity offsetting?	Ecological equivalence , The designing offsets (metrics used) Feasibility in achieving “no net loss”	<ul style="list-style-type: none"> • News papers, • Journal articles • Books. • Reports
How is the UK biodiversity offsetting developing?	Theory of institutional change	<ul style="list-style-type: none"> • Defra homepage • Books • Journal articles • UK biodiversity conservation documents • Personal communication

4.5. Research ethics

The research adheres to the ethical principle of a scientific research work. All secondary information is properly acknowledged with proper citation and referencing. Sensitive data on individuals, companies, government bodies, business and communities are not made public without consensus from respective bodies.

5. Analysis and discussions

This chapter consists of three main sections, covering each of the research questions respectively. The first section will start with a general description of biodiversity offsets, how it is practiced globally, and its guiding principles. Then, a description of the governance structure that best characterize biodiversity offsets programs will follow.

In the second section, views of different scientific scholars about biodiversity offsets as policy instrument in achieving “no net loss” policy goal will be provided by elaborating their views on the strengths and weakness of biodiversity offsets.

The third section will present the entire biodiversity offsets institutionalizing processes in the UK by presenting the sequences of biodiversity offsets related events, actors and their role and the positions they take.

5.1. General features of biodiversity offsets programs

There are two different biodiversity offsets systems. The first is the mandatory offsets — which come as a response to legal requirement or planning provisions by the public. The second is voluntary offsets — initiated by the private sector (firms and companies, individuals) for business and /or philanthropy reasons. Example Rio Tinto — a mining company known for practicing offsetting for impacts created by the mining activities (Bayon & Jenkins, 2010; Madsen et al., 2010)

According Madsen et al. (2010), even though technically (what, where and how) different, biodiversity offsets programs are being practice worldwide. A project by the ecosystem marketplace called, the business and biodiversity offsets program (BBOP) provides biodiversity offsets related information from all over the world (Madsen et al., 2010). (See appendix I).

The registered biodiversity offsets programs were categorized to see their global distribution and results are as follows.

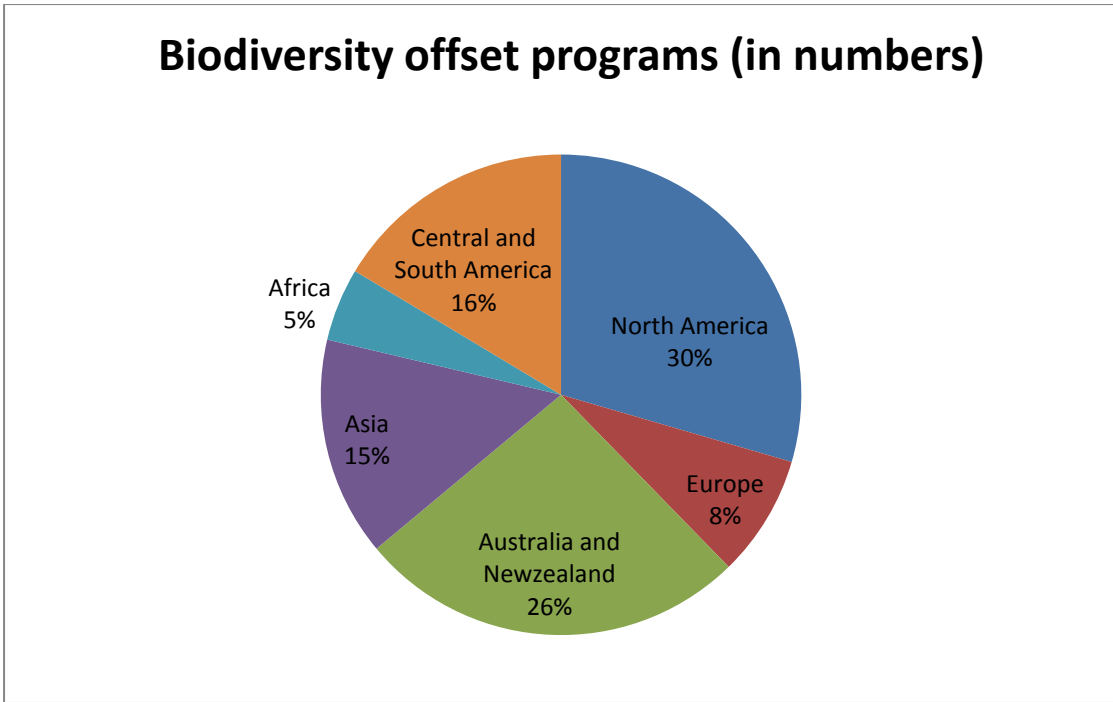


Figure 3: Global distribution of biodiversity offsets programs

(Ecosystemmarketplace, 2013)

As indicated by the above pie chart, biodiversity offsets programs are dominantly practiced in North America (The US and Canada) and Australia and New Zealand. Based upon the data presented by the ecosystem marketplace report, biodiversity offsets programs practiced in the US and Australia as compared to programs in the other parts are the most advanced ones in terms of their governance structure. However, irrespective of where the offsets is practiced, adherents of biodiversity offsets suggest offsets must be done in consistence to the predefined principles.

5.2. Basic principles of biodiversity offsets

The Convention on Biological Diversity and its ecosystem approach, as articulated in National Biodiversity Strategies and Action Plans are usually the bases in all the ongoing biodiversity offsets programs (Madsen et al., 2010; Ten Kate et al., 2004) According to Madsen et al. (2010) the principles establish a framework for designing and implementing biodiversity offsets and verifying their success. The principles set by Madsen et al. (2010), Darbi (2010) and Ten Kate et al. (2004) include the following:

The broad argument of "polluters pay principle": This principle stands from the basic argument that says those who create the damage are liable for compensating the damage and

must bear the cost to restore it (Darbi, 2010; Ecosystemmarketplace, 2013). According (Ecosystemmarketplace, 2013), the EU's Environmental Liability Directive which is in place to harmonize previous liability regimes is part of this principle and is the foundation for biodiversity offsets policies in Europe. It is clear from this principle; developers can feel more responsible for minimizing cost, and this can give effect to the principle of “mitigation hierarchy”. In addition, this principle gives budgetary relief to the public as costs to monitoring and management of biodiversity as developers themselves cover the costs.

The mitigation hierarchy: Under this principle, developer first must try to avoid damage to biodiversity. However, if development is sought despite the damage to biodiversity, developers must strive to minimize the damage either on their early stage (i.e. designing) or at later stages, by implementing some mitigation measures (Madsen et al., 2010). According Madsen et al. (2010) strict adherence to the mitigation hierarchy ensures the measurable outcomes of biodiversity resulted from offsetting. The conclusion is that, offsetting must be taken as the last alternative available to the technically unavoidable residual impact of development, to achieve a "no net loss" target. (see fig 3.1)

Proximity: Offsets must be planned in the nearest possible geographical location in which the damage is taking place. The concept of nearest possible geographical location According Madsen et al. (2010), is to ensure the inclusion of information regarding biotic, abiotic, social and cultural in planning the biodiversity offsets. The main objective of taking full range of available information on the biological, social and cultural values help better results in terms of the functioning of the ecosystem. Even though the service's biodiversity provide from local to international, the functions are more local than international. For example, Clare and Krogman (2013) found that the guideline in Canada says, offsets must be done in a range of zero to 20km distance from the impacted area.

Additionality: This principle advocate that any offsets must result in a measurable conservation outcome, both new and additional — It must assure the foregone losses are replaced by offsetting. It is also considered additionality if the management of an existing biodiversity reserve contributes to the maintenance of biodiversity beyond the business as usual scenario. An example of this type provide by Ten Kate et al. (2004) is improving forest management by controlling illegal logging with the help of money from offsets funds. The issue of displacing impacts to neighborhood landscape is also seriously considered in

additionality. This means, activities implemented to offsets impact must not come at a cost of creating impact to another landscape.

5.3. Governances structure

To build a coherent understanding of biodiversity offsets governance structure, assessing how systems are progressively linked to each other and interactions that occur across diverse actors and institutional scales is needed. The governance structure observed in biodiversity offsets combines communicative consultation and regulatory market (Ecosystem marketplace, 2013). Similarly, Cashore (2002) observed the manipulation of global markets and the attention to customer preferences will be the main driver of future environmental policies.

5.3.1. Actors and their role in biodiversity offsets

To identify actors and their role in biodiversity offsets program, it is important to look on the different biodiversity markets mechanism proposed by Madsen et al. (2010). The main actors in the offsetting programs includes government bodies (represented by local or district authorities & regulators), land owners, developers, intermediaries, conservation specialists or ecologists (Ecosystemmarketplace, 2013). Norton (2009) has also observed the involvement of the court in approving offsets programs in New Zealand. A wide variety of actors are involved in the different offsets programs. I have observed variations both, in types of offsets programs and country in which the program operates. For simplicity, I will try to see actors by categorizing in two groups — public and private actors.

5.3.1.1. *The state as an actor*

In most of the studied biodiversity offsets programs generally the state plays different roles depending on the type of offsets programs and institutional setting in which the offsets operates. The main role of the state in most of the cases is to create pressure for developer to accept the rules for offsets (Bayon, 2008). However, there were cases where the state also participated in the actual offsets activities by providing land to be used in implementing offsetting (See section 5.2.3.1). Samuel et al. (2011) also emphasizes the importance of the state in establishing the market for biodiversity by creating strong system of regulation and governance. The Impact Mitigation Regulations in Germany is a typical biodiversity offset program with strong state regulation (Carroll, personal communication; Ecosystem marketplace, 2013). The state also forces buyers and sellers to negotiate prices—through regulations. In this way, the state contributes in generating demand for a biodiversity market.

Similarly in the supply side, the state have a bigger role in establishing true markets by creating attractive institutional framework to potential actors interested in the conservation of biodiversity — a situation that help flourish multiple sellers to satisfy the demand by developers. The state helps in establishing the market in two ways — finding those damaging and paying to those who contribute for conservation of species.

5.3.1.2. The roles of the private sector:

In biodiversity offsetting programs, particularly the habitat banking system, non-state actors have both the role of sellers and buyers of offsets. In the demand side, the role of the private sector includes implementing rules of biodiversity offsets. A land owner for example can participate in offsetting by providing land to use as biodiversity bank either through environment stewardship schemes or by taking the business opportunity created by habitat banking (Bayon, 2008). Bayon found that, the US conservation banking programs have motivated land owners to create habitat banking.

Other important private actors are the intermediaries. The common role of these types of actors is brokerage between credit buyers, credit seller and policy administrators. This is to help make transaction cost effective. According to Coggan, Buitelaar, Whitten, and Bennett (2013) intermediaries' main task is to provide specialized information with regard to assessing an acceptable metric for offsets, finding both a buyer and seller, negotiate contracts and setting the price, help developers in negotiating the process of offsetting and preparing documents in accordance to the criteria set by policy administrators.

5.3.2. Institutions and biodiversity offsets

There are diverse scenarios with regard to institutional arrangement of biodiversity offsets. According to BBOP (2009), the differences emerge from the settings in which offsets operate, actors involved and financing of biodiversity offsets programs. For example a biodiversity offset that is part of protected area has different institutional arrangement than offsets which are not part of protected area. In a similar way, offsets managed by governments show different institutional arrangement than offsets managed by the private sector - i.e. NGOs, companies or foundations. These variations are related to the types of biodiversity offsets - the compliance and voluntary (see fig.5.2). To establish market based policies such as trading and pricing a strong system of regulation and governance is needed (Samuel et al., 2011). Some environmental scholars support this argument strongly for the

reason that biodiversity have a public good characteristic which demands institutions with reciprocity interactions (Bergseng & Vatn, 2009)

5.3.2.1. Formal institutions

Doswald et al. (2012) observed three major groups of regulations that countries use as a framework for introducing biodiversity offsets programs in their environmental policy design. These include species and habitat legislation, environmental impact assessment and offsets or compensation regulations. According to Doswald et al. (2012); Ecosystemmarketplace (2013), the foundation for the compliance driven biodiversity offsets are the above mentioned three legal acts, and authorization to impact must be done in accordance to with such acts. If we take the impact mitigation regulation in Germany operates under German Federal Nature Conservation Act. This act is enforced under the offsets or compensation legislative framework. Similarly, the Fish Habitat Compensation in Canada works under the Fisheries Act and the 1986 Policy for the Management of Fisheries (Bayon, 2008; Doswald et al., 2012). The act requires Fish Habitat Compensation for any impacts to fish habitat. The US conservation bank functions under especial section of Endangered Species Act, and the US mitigation bank under Federal Government's Clean Waters Act 1972 recently issued as Clean Water Act 2008 by the by the army corps engineers(Ecosystemmarketplace, 2013). Both these programs are primarily Offsets programs in Central and South America operate under the impact assessment legislation (Doswald et al., 2012).

Drawing the theory of institutions by Vatn (2005), especially the role of institutions in influencing individuals by regulating rights, the formal institution in biodiversity regulate both the impact to biodiversity and helps regulators in defining standards and procedures to be followed (Bayon & Jenkins, 2010; Ecosystemmarketplace, 2013). Bayon (2008) also observed that formal legislation are extensively used as a reference to the monitoring and measuring success of the offsets programs. BBOP (2009) and Ten Kate et al. (2004) suggest that actors who participate in offsetting, have both options of using existing legal frameworks or introduce new policy instruments that can facilitate the approval of biodiversity offsets projects.

As indicated in the biodiversity offsets implementation handbook BBOP (2009), in the process of institutionalizing biodiversity offsets in which the main actor is the state, existing institutions are usually preferred. However, in situations where the main actors are a private

sector (NGOs, companies or foundations) new institutions or organization may be needed, but still the private sector have the options of using existing institutions too (BBOP, 2009).

In the following table, shows how formal institutions are extensively used in the institutionalizing biodiversity offsets.

Table 3: formal institutions and their role in producing of biodiversity offsets programs

Offsetting Program	Relevant Legislations	Policy goal
BushBroker (Australia)	Native vegetation management framework (2002) Bushbroker native vegetation credit registration and trading paper(2006)	“Net gain” by a reversal to the long-term decline in extent and quality of native vegetation across the entire landscape.
Conservation banking (USA)	Endangered species act 1973 US army corps of Engineers regulation	Offsets adverse impact to endangered and threatened species
Forest Code Offsets (Brazil)	Lie No.477I of 1965 Lei No.14.247 of 22/7/2002 Decrato No.4.340 of 22/8/2002	No Net loss of habitat under a defined minimum forest cover for private landholdings
Impact Mitigation Regulation (Germany)	Federal Nature Conservation Act (1976) Federal Building and Spatial Planning regulations(1990)	Maintain overall ecological coherence of the site

Source:Bayon (2008) & Ecosystemmarketplace (2013)

5.3.2.2. Informal institutions

In most of the cases, informal institutions the foundation for voluntary biodiversity offsets programs. According to Doswald et al. (2012), the motivation for that is good practice commitments, external pressure or market access that influence operational practices such as certified products. The international Convention on Biological Diversity (Bell, 1992) can be taken an as umbrella of informal institutions that underpins the voluntary biodiversity offsets. Under this convention, countries base their biodiversity offsets programs with their specific

policy goals against a given legislation. The studied biodiversity offsets practices in the different countries are different, this can be explained the differences in the informal institutions of each country. Even countries with size of economy, expertise, and technological progress show difference in the biodiversity offsets governance structure. For example as compared to Europe, biodiversity offsets in North America and Australia shows more market -like governance structure. Although, the reasons for such difference are a potential research question, two thinkable explanations can be given. One is the lack of space to create conservation bank in producing credits for sale and the second is the differences in the economic infrastructure in place. In modern economies such as in USA, Canada, Australia the learned norm that says market can solve environmental problem is already cultivated as compared to in Europe where a combination of both modern and traditional economy influences stakeholders' behavior. In theory, this can be explained by Vatn (2005) which says, institutions regulate individual motivation by influencing rationality. Pahl-Wostl (2009) also showed compatibility of both formal and informal institutions is important for governance structure to sustain and progress. The prove, for such theories can be also found in Lawton et al. (2010) that says, participation of stakeholders is possible when a stakeholder believe an innovation is desired, acceptable and feasible in the society.

5.3.3. Types of biodiversity offsets

By studying the documented biodiversity offsets programs [by the ecosystem marketplace,], I noticed, it is difficult to produce a typology that can best characterize the variations in governance structure, due the diverse nature of biodiversity offsets programs. For fair representation of the variations observed, I categorized biodiversity offset programs with similar governance structure. This way, it was possible to closely see the governance structure that best describe the governance structure in place.

The variations in governance structure are as a result of the objective offsets program and the actors involved, the roles each actor play (Madsen et al., 2010). Three distinct categories are observed. These include - compensation, one-off offsetting and offsetting via purchase from banks (created biodiversity reserves).

The following figure provides the categorizing of biodiversity offsets programs.

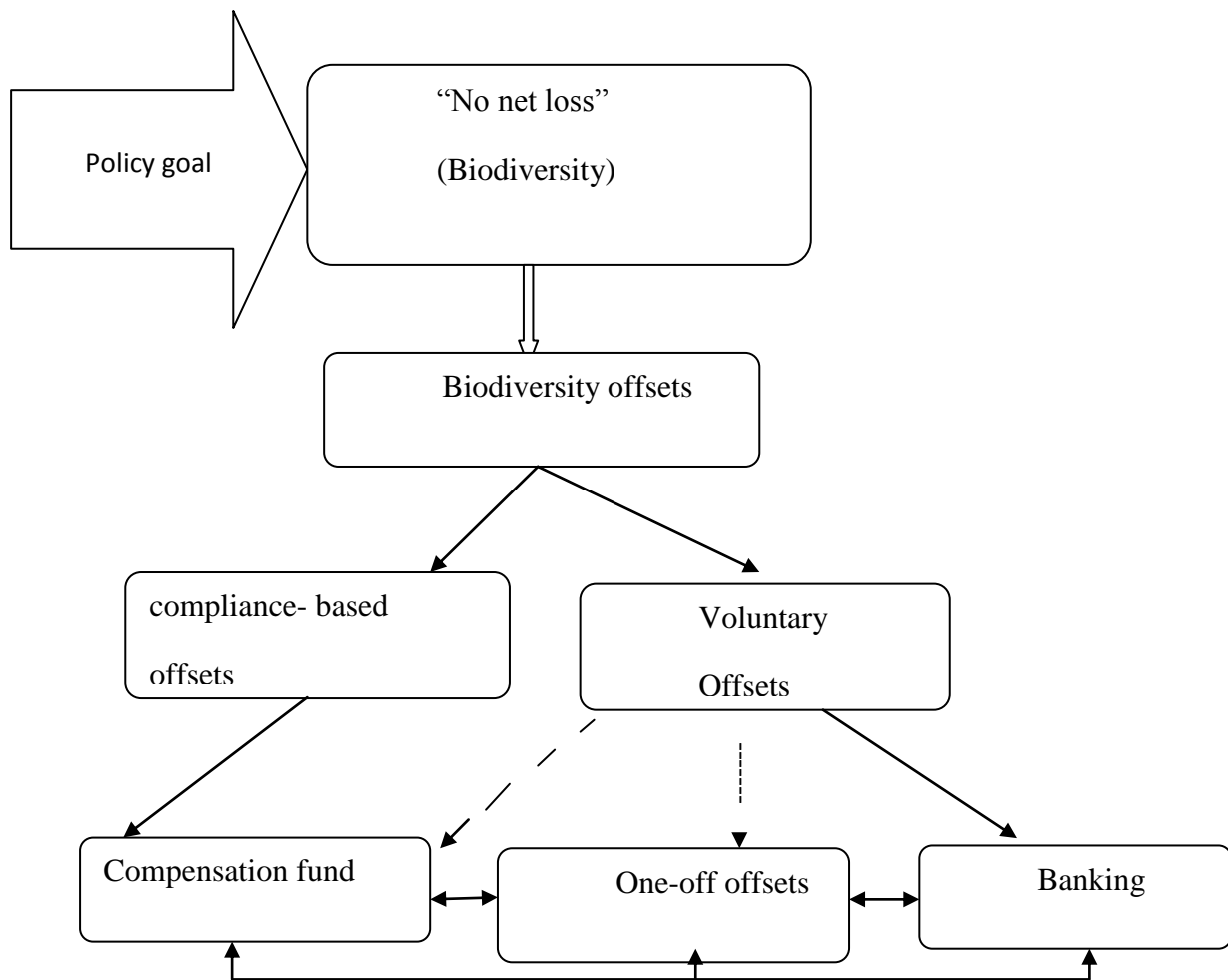


Figure 4: Categorizing biodiversity offsets programs

Ecosystemmarketplace (2013)

Some combination of these three groups observed. The common combinations are compensation, and one-off offsets, compensation and banking or sometimes all the three offsets categories.

In practice it is possible to combine the three offsets types. Fishier offsets in New South Wales, Australia for example gives developers an alternative to select or combine three different types of offsets (Burgin, 2010). According Burgin (2010), to offsets impacts to sea grass— a fish habitat - developers can do the offsetting in three different ways: by transplanting sea grass, constructing fish ways or paying to a conservation trust fund. Therefore, the flexibility of biodiversity offsets for the conservation of biodiversity is proved.

According to the ecosystem marketplace database at speciesbanking.com, there is a total of 55 biodiversity offsets programs in practice all over the world. The number includes both active offsets programs and programs under development.

Table 4: Types and number of biodiversity offsets programs in the different continents

Regions \ Offsets types	Compensation fund (C)	One-off offsets (O)	Banking (B)	Combination (C+O)	Combination O+B	Combination C+O+B	Total
North America	4	8	2	1		2	17
Australia & New Zealand		12		2	1		15
Central & south America	4	4		2			10
Asia	1	5	1				7
Europe		3					3
Africa		2		1			3
Total	9	34	3	6	1	2	55

Source: Ecosystemmarketplace (2013)

As indicated in the above table, the one-off offsets are the largest in number of programs globally with total of 34 programs. Since one-off offsets are implemented as a response to environmental impact assessment, the number can be associated to fact that many countries have already started implementing the environmental impact assessment regulations. But not all the one-off offsets have reached institutional maturity. For example, out of the 34 programs only 6 (all in North America and Australia) have available data on the size of the offsets (both area and investment). The commutative size of all the 6 programs is 238912 hectares and \$ 1236.2 million (Ecosystemmarketplace, 2013).

Banking is designed to fulfill the species or habitat legislations and dominantly practiced in countries like the US, Canada and Australia. The banking and the combinations have better

records of size both in area and investment. The area under such program is 123808 hectares with \$ 212 million investment. The given figures about the size can not be used for comparison between one-off offsets and banking, because neither of the offset types have a complete record of their investments.

A more general description of the three different types of offsets programs which are relevant to the objective of the research is summarized in following table.

Table 5: Characteristics of biodiversity offsets programs

	Compensation fund (C)	One-off offsets (O)	Banking (B)
Main actors	Government (federal or local) Developers Restoration and enhancement projects NGO	Developers (land owners) Protection authorities (Regulators)	Planning authorities, Local government Developers , Joint investment companies Intermediaries Traders
Offsetting measurable outcomes	Paying to compensation fund	Like- for- like Case – by- case offsetting	Like –for- like trading
Responsible body for offsets activities	Restoration organizations,	Developers	Habitat bankers Conservation management groups/intermediaries
Motivation	Demand side, Mandatory (as a compliance to law)	Compliance Voluntary Business issue (certify products)	Business, Supply side, To increase social benefits

Source:Ecosystemmarketplace (2013)

One thing common in all the biodiversity offsets types is the involvement of the public authorities' at different stages. This finding show the conclusion made by Bayon and Jenkins (2010) that says government regulated markets improve results in natural resource trading.

After reviewing all the biodiversity offsets programs registered in the ecosystem marketplace database, I have observed tremendous variations between offsets programs. In my observation, the variations are results of legislative frameworks in which the offsets programs base. For example the environmental impact assessment is the guiding legislative framework of most of the one-off offsets programs. The offsets and compensation regulations direct the compensatory type of offsets while the species and habitat regulation is typical for the banking system.

To see the details of these variations I will characterize the governance structure of the three above identified offsets programs by selecting examples of each.

5.3.3.1. Compensation fund

Compensation fund requires developers to pay to biodiversity fund as means of offsetting to damages they cause. It can be done at regional or national level. The mechanism works in agreement with the polluter pays principle; obligations required by developers to offsets impacts to biodiversity as a compliance to offset or compensation regulations

First, developers pay to a conservation fund. The fund then can either be put for offsetting work directly or reinvest indirectly for research, education and extension activities that focus on biodiversity conservation. According the data provided by the ecosystem marketplace examples of the compensation systems are: Wetland compensation agreement between Manitoba's Infrastructure and Transportation Agency and Manitoba Habitat Heritage Corporation (Manitoba, Canada), Wetlands Conservation Policy (New Brunswick, Canada), Wetland Conservation Policy (Nova Scotia, Canada), 2003 Wetland Conservation Policy for Prince Edward Island(Canada), Conservation Trust (Paraguay), Forest Vegetation Restoration Fee (China) and Impact Mitigation Regulations (Germany). Although some variations are observed, the general mechanism is that, the fund obtained from developers is either put for offsetting work directly to restore, create, enhance, or avoid loss or degradation of biodiversity or indirectly reinvested for research, education and extension activities that focus on biodiversity conservation. Though the system is categorized as compensation, variations in its governance structures are observed between programs. Even the three programs in Canada shows variation with respect to the actors involved and the specific roles they play (Rubec & Hanson, 2009).

The Wetland compensation agreement between Manitoba's Infrastructure and Transportation Agency (MITA) and Manitoba Habitat Heritage Corporation (MHHC) in the county of

Manitoba a typical example of the compensations program. The programs is implemented to offsets impacts to waterfowl habitat (WFH) (Rubec & Hanson, 2009). MHHC is responsible for offsetting implementation. The MHHC offsetting activities are done in two ways. Conservation agreement with private landowners and restoring WFH in lands donated by the municipality and private land owners. According MHHC (2012) out of a total of 138, 724 acres of land impacted by MITA during construction of a highway 125,432 acres of land was restored by offsetting. The 113, 056 acres was done on private lands through conservation agreements and the rest 12, 376 of the offsetting was done on donated or acquired land by the MHHC.

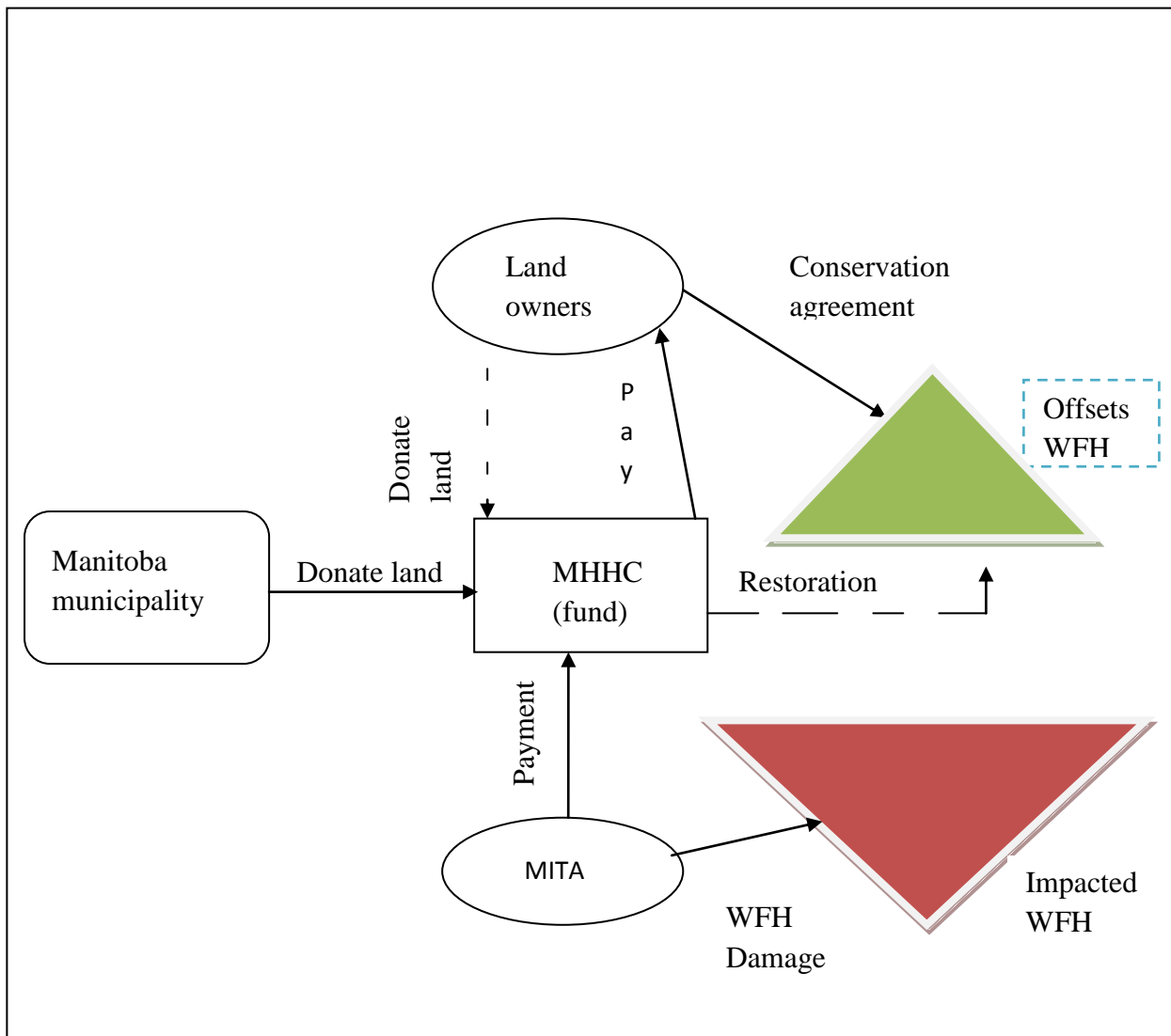


Figure 5: Actors and roles played in compensation.

source: MHHC (2012)

This is a unique case, actors and their role shown on the above illustration is not a representative of all the compensation type of biodiversity offsets, but rather to describe exceptionality in its governance structure.

Although some According Ecosystemmarketplace (2013) regulation and monitoring of offsets areas and a lack of clear guidance to achieve "ecological equivalence" in selecting land owners to adequately trade is still not sufficient.

5.3.3.2. One-off offsets

Offsetting activities in one-off offsetting are carried out by developers themselves as compliance to impact under a specific conservation act or agreement. Normally, offsets are created on developers land with no purchase values for biodiversity — an internal trade. In most of the cases payment to conservation funds is not allowed. However, developers can make internal agreement to trade their impact (Ecosystemmarketplace, 2013). Two typical examples of compensation through trade are the Forest Code Offsets (Brazil) and Environmental Services Certificates (Paraguay).The driver of the mechanism is that the law demands land owners to maintain a portion of their land undeveloped. For Example the payment for ecosystem law “PES law 3001/06” in Paraguay requires landowners to maintain 25% of land under natural forest (Ecosystemmarketplace, 2013). In a similar way the Brazilian forest code offsets requires land owners to maintain a certain portion (depending on regions and forest degradation rate) of their land in natural forest. The mechanism works by the “cap and trade”. Under this mechanism, land owners can go below the minimum limit given by law, if they find a landowner(s) who still maintain above the minimum limit and agreed to trade, to compensate impact.

The Vegetation Management Offsets in Queensland, Australia for example works under Vegetation Management Act of 1999 (Ecosystemmarketplace, 2013). In the vegetation management offsets details of offsets are specified on regional vegetation management code (RMVC). Approval processes for applications to clear land are assessed against the RMVC. According Ecosystemmarketplace (2013), developers proceed to clearing part of their land only when they present biodiversity offsets proposal to environmental protection authorities. After developers present the proposals, the environmental protection authority reviews the significance of the impact based on comparable vegetation, area, location, strategic position, regaining remnant status, and landscape context attributes and propose the offsets needed.

No standard metric to calculate impact or offsets is available; but like-for-like or like-for-better offsetting are preferred and most of the offsetting is done on case-by-case basis. Under the RMVC, Offsetting ratio in Queensland varies from 1:1 to 4:1. However, neither impact nor offsets is allowed in areas of very high conservation significance (Ecosystemmarketplace, 2013).

Although in majority of the case is as explained, there are also cases in which developers voluntarily do the one-off offsets. For example, Ambatovy mining projects by Rio Tinto is doing voluntary biodiversity offsetting in Madagascar (Bayon & Jenkins, 2010; Madsen et al., 2010).

The one-off offset is less complex when compared to the other two types of biodiversity offsets program. It is due to the number of actors involve which make the program straight forward to understand. Only developers and environmental protection authorities are directly involved in the process of offsetting. Out of the total 55 registered biodiversity offsets programs 34 fall under this category. Reflecting on the theory of transaction cost, the program can bear extra cost to environmental protection authorities for the reason that the protection authorities would interact with each and every developer in the given region, which ultimately a social cost.

5.3.3.3. Banking

In the banking offsetting type, a third part takes the role of producing biodiversity reserve that can be purchased by the developer to offsets their development impact. It is different from the first two offsets types in that it works in the supply-side — help flourish biodiversity offset suppliers to market. Usually intermediaries and traders are involved to facilitate the transaction. Only 6 of the total 55 biodiversity offsets registered in the ecosystem database satisfy as banking. (See appendix 1).

The US aquatic compensatory mitigation program is the oldest, biggest and well developed biodiversity offsets program (Ecosystemmarketplace, 2013). The program is a combination of two mitigation programs: the US wetland and stream mitigation programs. The USACE is responsible for authorization of mitigation banks, interperate and implement regulations at regional level. In the US a mitigation bank is considered as a bank after it is approved by the USACE to sell compensatory mitigation credits. Credits determination varies by corps district but the number of credits is calculated by the area of the site and the functional value of the wetland or a stream.

According to Ecosystemmarketplace (2013) biodiversity offsets database, government bodies are both the most common buyers and the sellers of credits. For example, one third of the credits are used by the government transport agency in the US compensatory mitigation banking program. In a similar way, in producing biodiversity credits, government bodies are dominant. The biggest land provider is for example the Bureau of land management and US fish and wildlife service's, which both are public bodies.

Table 6: Actors and their role in the US compensatory mitigation banking

Actors	Roles			
	Seller	Buyer	Intermediary	Legislation & monitoring
Land owners	X			
Bureau of land mangment	X			
US fish & wildlife services	X			
National park services	X			
Bank sponsors			X	
US ACE				X
US Environmental Protection Agency				X
Us national mitigation association				X
Local regulatory agencies				X
Community interest constitute				X
Government transport agencies		X		
Residential & commercial developers		X		
Extractive industries		X		
Utilities		X		
Department of defence		X		

Source: Ecosystemmarketplace (2013)

Each mitigation banker is responsible for establishing a wetland bank under strict environmental guidelines by the corps. To provide credits for sale, bankers restore, enhance, create or preserve a habitat. To be authorized for sell, banks must follow strict environmental guidelines. When approved by the corps, Bank is released to the bank sponsors/intermediaries to be used by developers to offsets impacts. However, about 15% of the credits can be produced even though the banking activities are not completed. The time frame for bank

development is between 6 and 8 years. Banks must be sold in 5 years time after approval, otherwise the bank expires.

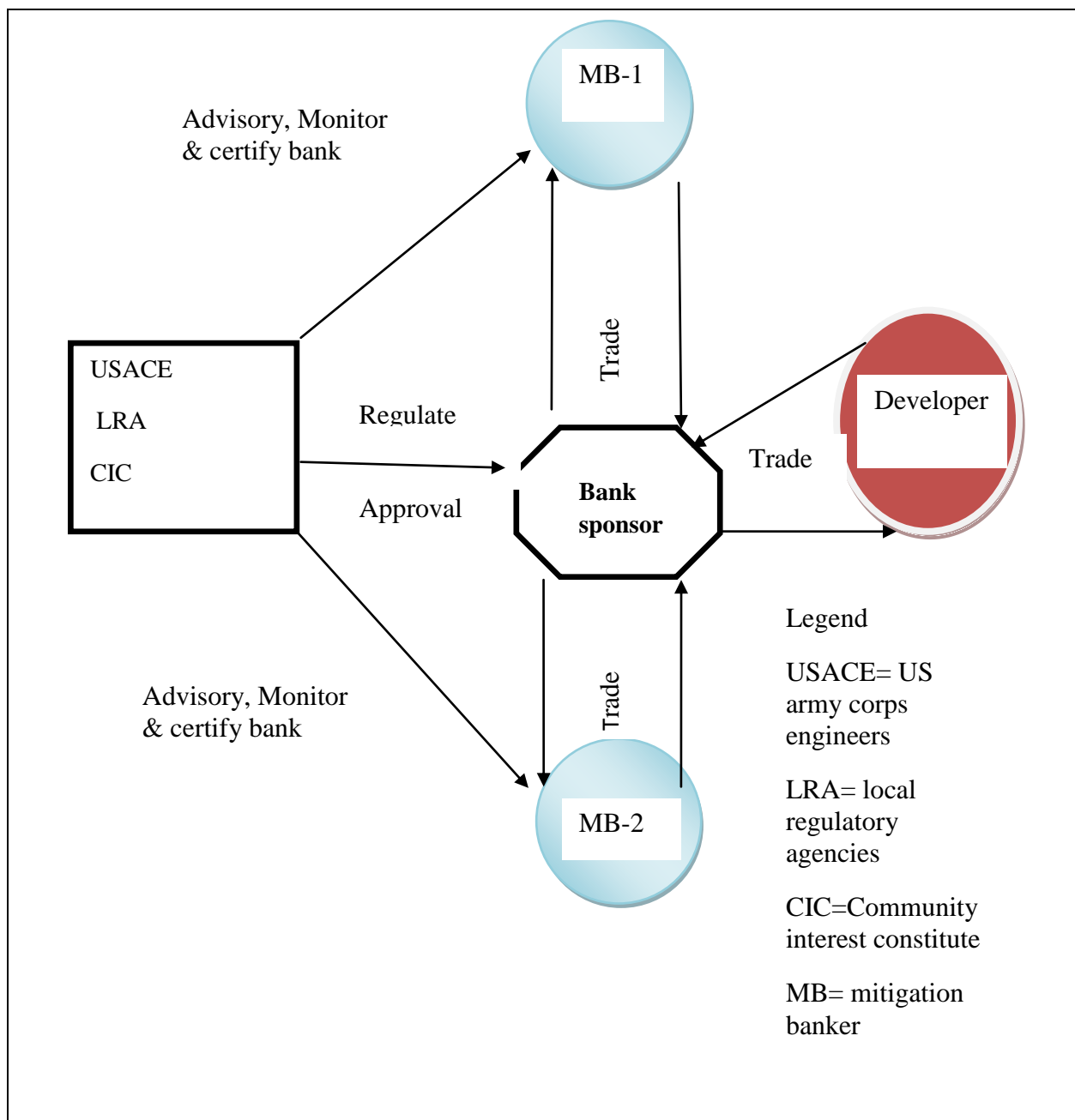


Figure 6: Actors' interaction in the US aquatic compensatory mitigation

Source: Ecosystemmarketplace (2013); MHHHC (2012)

As illustrated in the above figure, MB-1 or MB-2 can be private or governmental mitigation bank. The bank sponsor takes a broker role and collects authorized banks for sale to developers after approved by the corps of engineers

5.4. Arguments for and against biodiversity offsets

Biodiversity is part of the wider ecosystem contributes to human well-being as in the form of food, fiber, water purification, nutrient recycling, plant pollination, flood control, aesthetics, cultural and spiritual (MEA, 2005; Nelson et al., 2009). However, due to habitat loss, resulted from increasing land use pressure, rate of biodiversity losses is becoming critical (Darbi, 2010). Many (Briggs, Hill, & Gillespie, 2009; Darbi, 2010; TEEB, 2010; Ten Kate, Josh Bishop, & Bayon, 2004), criticize the conventional conservation instrument which depends on planning for the delays it creates in the implementation of development projects—a cost to society. As a solution to this problem of balancing economic development and nature conservation biodiversity offsets is emerging as a potential policy instrument (Ten Kate et al., 2004). The instrument advocates for offsetting unavoidable residual impacts due to habitat loss by creating a similar habitat elsewhere and this way a “no net loss” target in biodiversity can be achieved. However, biodiversity offsets as an instrument to realize the “no net loss” target is controversial and is criticized by many. Some of the main arguments for and against the biodiversity offsets are summarized as follows.

5.4.1. Arguments for biodiversity offsets

Biodiversity offsets is getting popularity as a tool in halting biodiversity loss caused by habitat loss. It has been advocated by many (Briggs et al., 2009; Madsen et al., 2010; Ten Kate et al., 2004) as a timely policy instrument with numerous advantages. Some of the arguments to support biodiversity offsets are summarized below.

Briggs et al. (2009), for ample, advocates biodiversity offsets for being flexible because it establishes collective partnership between landowners, biologists, consultants, planners and developers.

5.4.1.1. Coupling economic growth and conservation of biodiversity

It has been a challenge to account biodiversity in economic models (TEEB, 2010), and most of the current biodiversity conservation policies have an antagonistic nature to development (Briggs et al., 2009). According to Briggs et al. (2009); Madsen et al. (2010); Ten Kate et al. (2004), biodiversity offsets invoked potentially to achieve objectives of development and conservation simultaneously. Briggs et al. (2009) advocates that biodiversity offsets can bring desperate parties together and this can create collective partnership due to the incentives the different actors get from involving in biodiversity offsets. Among their arguments include: developers have less responsibility to provide offsets proposal to proceed to damage because

the alternative they have to offsets impacts from purchase. At the same time, habitat bankers are motivated by the economic success from selling biodiversity credit. Similarly, effective conservation and funds to monitor ongoing biodiversity projects is a strong motive for conservationists. Not least, local authorities benefit from economic growth, because, conservation turns out to be business and creating job opportunities and income to local communities.

As per this argument, in simpler terms the message is, if a development of a project is deemed beneficial to society despite its negative impact to biodiversity, offsetting the impact by creating a similar biodiversity reserve on another site in the same geographical area can minimize negative effect of the damage. The US conservation bank system for example works based on the idea:

“if you conserve large enough tracts of high quality habitat, provide habitat connectivity to other preserved sites, and manage the land to support species ' recovery, the species will persevere and thrive despite a net loss of habitat” (Madsen et al., 2011. pp- 16).

Therefore, as long as developers fulfill criteria of the above statement, they can continue to develop their land.

5.4.1.2. Measurable conservation outcomes

Biodiversity offsets have the potential to bring measurable conservation outcomes in biodiversity (Bayon & Jenkins, 2010; Darbi, 2010; Madsen et al., 2010). According to Darbi, (2010) this can happen in two ways. The first is, counter balancing a species lost in one place by creating the same species in another geographical area. According to the second is, biodiversity offsets maintains the status of ecosystem that could be lost in the absences of offsetting. This is also supported by Norton, (2009). In this way, it can make conservation possible both in space — geographical location and time — for the future in the form of banking nature (Sullivan, 2013). The general argument is, even if we did not offset, we still continue to build houses, roads, airports, football field, and golf course.

5.4.1.3. Contribute to resilience of wide ecosystem function

Adherents of biodiversity offsets, (Bayon, 2008; Briggs et al., 2009; Darbi, 2010), believes that biodiversity offsetting, especially the banking part, enables beforehand conservation i.e., through banking biodiversity or restoring degraded biodiversity. This means offsetting impacts can be assured before the real impact takes place. According the adherent of

biodiversity, this helps to maintain ecosystem functions and contribute to its resilience. Ten Kate et al. (2004) also wrote that it is theoretically possible to create one large conservation bank in advance of impact to be used in offsetting impacts of small multiple projects, in the future. In connection with the issue of resilience, Hallwood (2007) and Briggs et al. (2009) see the potential of biodiversity offsets to be used as a tool in connecting fragmented habitat to create ecological networks. According, Briggs et al. (2009) connecting ecological networks, enables species or genes to freely move within the system and this way the resilience of the ecosystem is enhanced. According to Briggs et al., (2009), in conservation of wildlife, connecting ecological networks is a common strategy to maintain ecological networks.

5.4.1.4. Investment opportunities in biodiversity offsets.

Biodiversity offsets are creating business opportunities to companies, and financial institutions. As a result, companies are incorporating biodiversity conservation in their operations. Biodiversity offsets is attracting entrepreneur interest (Bayon, 2008; Bayon & Jenkins, 2010; Madsen Becca, Carroll Natheneil, & Kelly, 2011; TEEB, 2010). Nature banking, which is part of biodiversity offsets have a potential to grow into a profitable investment for companies (Bayon, 2008). According to Madsen, et al. (2011) reported the annual global market size of biodiversity offsets is to be between \$2.4 – \$4 billion. The authors also make clear that about 80 % of the biodiversity market operators was not transparent enough to estimate their business size. in addition the, authors says their estimation was based only on the registered biodiversity offsets programs.

Although the regulation-led markets are common in trading natural resources (Bayon & Jenkins, 2010) provided some initiatives by the private sectors – including multi-national companies involving themselves voluntarily in offsetting damages. According to Bayon & Jenkins, (2010) wetland mitigation banking is one of the well-established ecosystem -market in the US to control the exploitation of aquatic resources. If any planned development have the danger of impacting a wetland, permit is given after a compensation by creating or optionally purchasing wetland of similar function and value (Bayon & Jenkins, 2010; Madsen et al., 2010). Emphasizing the business opportunities created by wetlands mitigation banks Bayon & Jenkins, (2010) show the size of investment to be \$2.4 billion a year only for the purpose of selling credits to developers

In a majority of cases, most of the authors who support biodiversity offsets as a policy instrument to achieve a “no net loss” target wrote similar arguments. However, more focused arguments have been also observed. The advantages of biodiversity offsets and the arguments that support the advantages in relation to the conventional conservation measures are summarized in the table below.

Table 7: Argument that support implementation of biodiversity offsets

Advantage of biodiversity offsets	Argument	Cited in
Potential to balance conservation with economy Reduce budgetary burden to the public	Make development possible Polluter pays principle	Bayon (2008); Ten Kate et al. (2004)
Biodiversity offsets make possible the incorporation of the value of biodiversity in the economic model of countries (make the value of biodiversity visible)	Turning cost into value Turning liability into asset Make clear estimates of benefits to society	Bayon and Jenkins (2010) TEEB (2010)
Measurable conservation outcome conservation in advance of authorized impact is possible	Additionality Reduce risk related to uncertainty	Madsen et al. (2010) (Briggs et al., 2009)
Reduce conflict of interest among different stakeholder by establishing collaborative partnership	By Bringing together landowners, conservation specialists, developers	Briggs et al. (2009)

5.4.2. Arguments against biodiversity offsets

It is difficult to institutionalize environmental governance policy without society accepting as necessary, desirable and achievable (Lawton et al., 2010). Healthy partnership in the leadership and participation of stakeholders is needed for best results (Bergseng & Vatn, 2009). Habitat banking/biodiversity banking type of biodiversity offsets is the most criticized but the most important issue to be considered in the development of habitat banking is to

balance the costs and benefits of biodiversity offsets projects (Faure & Skogh, 2003). Benefits and costs can be seen more than financial equivalence because it is impossible to capture a total value of biodiversity in monetary form (A. Vatn, 2000). There exists also situations where valuation of environmental services is complex and difficult which demands ethical and moral issues beyond economics (Faure & Skogh, 2003; TEEB, 2010; Vatn, 2005; Arild Vatn et al., 2011).

After reviewing publications, the main arguments that challenge biodiversity offsets as a potential policy instrument for the conservation of biodiversity, I categorize the criticism of biodiversity into two groups — methodological problems and practical challenges.

Regarding methodological problems, arguments that in principle questions the feasibility of biodiversity offsets as an instrument to conserve are presented and discussed.

Regarding practical challenges, although biodiversity offsets is in principle accepted, there are issues attached to designing and quantifying. Remembering biodiversity offsets have different forms —compensation fund, one –off offsets, and banking (see section 5.1.2) — therefore the views also differs. This means, the same author can support compensation but not banking.

5.4.2.1. Methodological problems and like –for –like issue

According to Walker, Brower, Stephens, and Lee (2009), all critique behind biodiversity offsets are due to the complex difficult to measure nature of biodiversity. Inherently, biodiversity have no a commodity nature (Bull, Suttle, Gordon, Singh, & Milner-Gulland, 2013; Quétier & Lavorel, 2011), and due to this nature, to be exchanged through trade it depends on proxies such as credit and debit (Bull et al., 2013). But, it is highly impractical to incorporate all biodiversity components in the credit and debit to make an adequately trade. Kosoy and Corbera (2010) argue, commoditizing ecosystem services to a single service reduce its multiple interdependent nature and its relationships to societies. In connection with this Kiesecker et al. (2009) criticized biodiversity offsets for the metric employed as being too narrow, usually depends number of species and area of land, i.e. hectares. Kiesecker et al. (2009) criticized the metric for not including multiple metric, which can capture ecosystem functions to help ecosystem services maintained. Maron et al. (2012) conclude, due to the non-interchangeable nature biodiversity has, trading biodiversity – offsetting in this case, cannot create a viable market. As indicated by Burgin, (2010), even in the most advanced and highly planned mitigation banks of the US, evidence shows, in practice, cannot

provide a full range of service that was in place by the native ecosystem. Kosoy and Corbera (2010) also claim, trading ecosystem via producers, buyers and intermediary flows can result in reproducing the problem of protection due to the power asymmetries that can be created in trading. After review of the US mitigation bank Burgin (2010) criticized the mitigation banks for not achieving like-for-like.

5.4.2.2. Practical challenge: license to trash

After reviewing offsets publications between 1989 and 2010 and key informant interview Clare, Krogman, Foote, and Lemphers (2011) found one of the main criticisms associated with biodiversity offsets in Canada is jumping over the avoidance and minimization level of the mitigation hierarchy. Clare et al. (2011); Darbi (2010) also observed, lack of properly following the mitigation hierarchy during implementation. The authors argue, offsets give the permit a developer to practice nature harmful activities that would have been rejected without offsetting. This way, developers to get access to high quality lands for development in the name of offsetting low quality lands elsewhere — a license to trash nature. Others, such as Gibbons and Lindenmayer (2007); M. Maron et al. (2012) found the problem of time lag between impacts and positive effect of offsets. In addition, the distinctiveness of some species makes biodiversity offsets inconsistent to the objective of "no net loss" target. In the context of adaptive management and making restrictions in clearing native vegetation enough to maintain proper ecological functions is needed. Similarly a review of restoration ecology literature by Maron et al. (2012), shows the gap between expected offsets and offsets in practices was big and this limit to the technical success of offsets policies. This is due the time lag between impact and offsets benefits, the inability to measure both impacts and offsets and the uncertainty associated allowing impact believing in offsetting in the future.

Maron *et al.* (2012) has illustrated his criticism as follows.

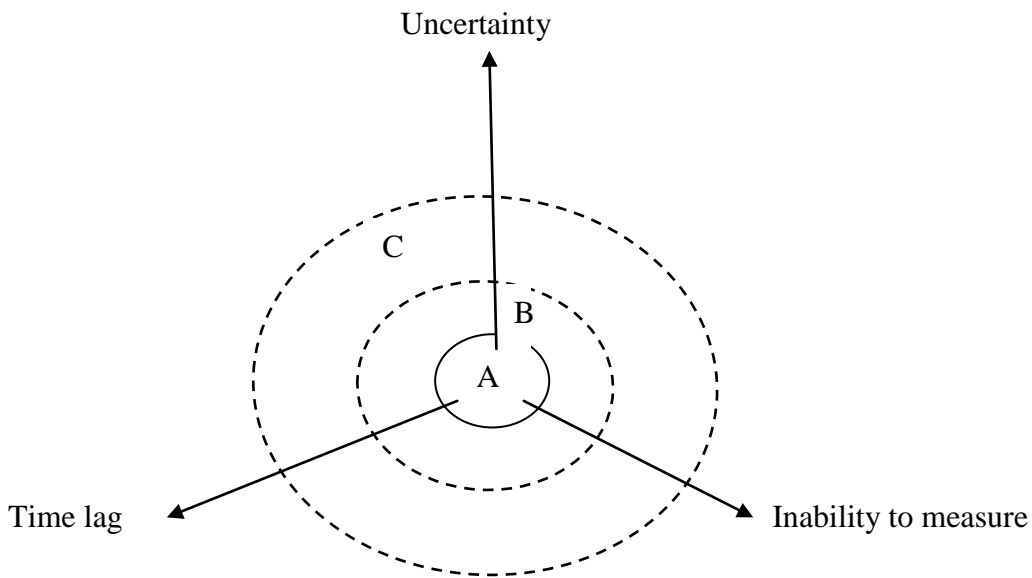


Figure 7: uncertainty, time lag and measurability axis

Adapted from Maron et al. (2012)

Emphasizing the uncertainty, time lag and inability to measure between impact and offsets Maron et al. (2012) developed a conceptual framework. Based on the conceptual framework developed by Maron et al. (2012), moving along the axes outwards is related to the level of risk biodiversity offsets experience. For example at point C the level of risk is unacceptable, level B has still high risk and point A is considered to be low risk. According to Maron et al. (2012), if not implemented properly offsets permits to biodiversity damage in the name of effective restoration and this can aggravates consequences of failure to restore nature.

The arguments against biodiversity presented on the above two sections, grouped as methodological and technical challenges are interrelated and an overlap of argument is unavoidable to the highly interrelated nature it has. In table 8 below, I have tried to summarize the main critics of biodiversity offsets and the argument that support the critic.

Table 8: summaries of main arguments against biodiversity offsets

Main critics	Argument	Cited in
Offsets at the expense of avoidance and minimization (Offsets justifies biodiversity damage)	Failure to make effort to avoid impact (step one mitigation hierarchy violated) compensation site location compensation ratio calculation	Clare, Krogman, Foote, and Lemphers (2011)
Risk associated with offsetting (Current design of biodiversity offsets is not sound enough to achieve the “no net loss” target).	Time lags Uncertainty Measurability of the value in the offsets	Maron et al. (2012)
Fall short of the “like for like” criteria (deficient in terms of ecological equivalence)	lack of formal methods for designing and sizing offsets requirements Poorly defined liabilities. Inherently difficult to create, or restore biodiversity and its function.	Maron et al. (2012) (Kiesecker et al., 2009); Quétier and Lavorel (2011); (Shelly, 2010)
In perpetuity	Lack of appropriate monitoring systems to a newly created or restored conservation site Funding shortage to finance the monitoring of conservation sites	Burgin (2010)
Limits on ecosystem commodification, (biodiversity offsets lacks appropriateness for the conservation of biodiversity)	Market overlooks the ecological & social relationship Foster individual rationality Inherent dislike to assign a monetary value for nature	Burgin (2008)

In the above table, I have tried to summarize some of the main critics and the arguments in which the critic is based. Except Burgin (2008), all the authors do believe on the potential biodiversity offsets to achieve a "no net loss" target. They rather suggest synchronize the the instrument to make the best out of it. From his explanation we can understand that the instrument is not fundamentally flawed.

Although evaluation of biodiversity offsets as a potential policy instrument in achieving “no net loss” in biodiversity is not possible at this stage, reviewing the argument for and against the instrument can help give a balanced view about offsets programs. The understanding at this level is that both the criticism and praises of biodiversity offsets are interrelated. Limits to offsetting is always in place, but the system can in some circumstances be appreciated in achieving the target of no net loss if meticulously planned, especially if the principle of mitigation hierarchy is strictly followed. By limits to offsets means, offsets must not be allowed for example to species that are in extremely critical status to extinction and for species that take long time before of offsetting start giving returns. Though biodiversity offsets is a common practice both in the USA and Australia, some environmental experts who have been has been researching on biodiversity are showing sign of doubts on the performance of the system. One of them is Dr. Philip Gibbons⁵. He wrote to the Guardian in an email correspondent as follows:

I am very disappointed with the gap between the principles of biodiversity offsetting and practice. The science indicates that it is not feasible in the majority of circumstances to destroy biodiversity at site A and simply reinstate it at site B. Thus, to achieve no net loss of biodiversity in Australia, we must be prepared to constrain development to those sites where biodiversity can genuinely be offsets – which means reducing the area available for development. Governments in Australia are reluctant to do this." (Vidal, 2014, Tuesday 11 March 2014 11.44 GMT)

Gibbons also disclosed that deforestation has increased in the state of Victoria since the introduction of biodiversity offsets, but since no effective auditing of biodiversity offsets is done so far in Australia, no evidence to support that deforestation is linked to the introduction of biodiversity offsets (Vidal, 2014).

⁵Dr Philip Gibbons biodiversity conservation researcher at the Australian National University, who has advised two Australian state governments and the International Union for the Conservation of Nature in the introduction of biodiversity offsets as a tools in achieving “no net loss” target to biodiversity.

5.5. Biodiversity offsets in the UK: institutional change perspective

Countries are continuously being pressed to change their environmental governance structures. The main press usually comes from the need to internalize externalities, economic conditions and to ensure participation of stakeholders (TEEB, 2010). Lemos and Agrawal (2006) for example observed that the changes in environmental governance are a result of a press from globalization, the need for decentralized environmental governance and the need for market- and agent-focused instrument. At present, UK is facing a twin challenge of economic development and biodiversity conservation (Defra, 2013). The government and some private bodies believe biodiversity offsetting as the best alternative to meet the two ends of development and conservation. However, implementing a new policy is the result of many processes and interactions. To see how such changes happen in practice, the currently in the process biodiversity offsets program in the UK is selected.

By drawing on the theory of institutional change Vatn, (2005) the section will present an analysis on the UK biodiversity offsets evolution. This part will devote on the process of institutionalizing biodiversity offsets, the actors involved and how the actors are shaping the outcome of the new policy. The issue under debate currently and decisions either to adopt or reject biodiversity offsets as a policy instrument for the conservation of biodiversity will give after June 2014. The department of environment food and rural affairs (Defra) is leading the process of institutionalizing biodiversity offsets in the UK. The whole process will be discussed in the following sections.

5.5.1. The need for biodiversity offsets

The “Set aside” is the current conservation policy in practice to stop the loss of biodiversity. Under this regulation, landowners are restricted by planning authorities to keep a portion their land for the conservation of biodiversity and are paid in return by the Environmental Stewardship schemes (Defra, 2013). In the UK, the set aside system is criticized for two things: First, it is slowing down economic development by restricting economic growth and second, the set aside system is seen as insufficient to protect biodiversity in the long run, because it gives result to separate and fragmented biodiversity pockets unable to promote one another’s mutual survival. Therefore, according to Defra, the system (set aside) is not an effective policy instrument both for the conservation of biodiversity and economic development. As per the Defra argument biodiversity offsets is a potential policy instrument that can contribute in solving the weakness the set aside have currently.

The government is claiming that biodiversity offsets can be used as a tool to maintain resilience of an ecosystem due to its potential to connect the pockets of biodiversity into a larger ecosystem. In the biodiversity offsets as an alternative policy instrument planned to be implemented by Defra, developers are allowed to transform a valuable habitat as long as they ensure the offsets of the affected habitats through separate habitat preservation of the same “biodiversity unit”.

5.5.2. Institutionalizing process: actors and their role

Two important driving forces about the processes on the developing habitat or conservation banking in the UK are:

First, it started as an initiative by ecologist, David Hill and colleagues, in collaboration with other potentially interested funding bodies like the wildlife trust, have established a potential biodiversity broker firm, called the Environment Bank. The task of the bank is to provide offsets for the UK and is involved in a number of quasi voluntary pilots. Second, it depends on the economic development strategy of the ruling party. The drivers on emerging policy on biodiversity offsets started with ecosystem market task forces assessment. The whole process led by the department for environment and food and rural affairs (Defra). The Green Paper consultation closed a month or so ago and a response from the government with a formal proposal as to how to proceed is anticipated in the summer 2014. The following timeline presents a summary of the biodiversity offsets institutional process..

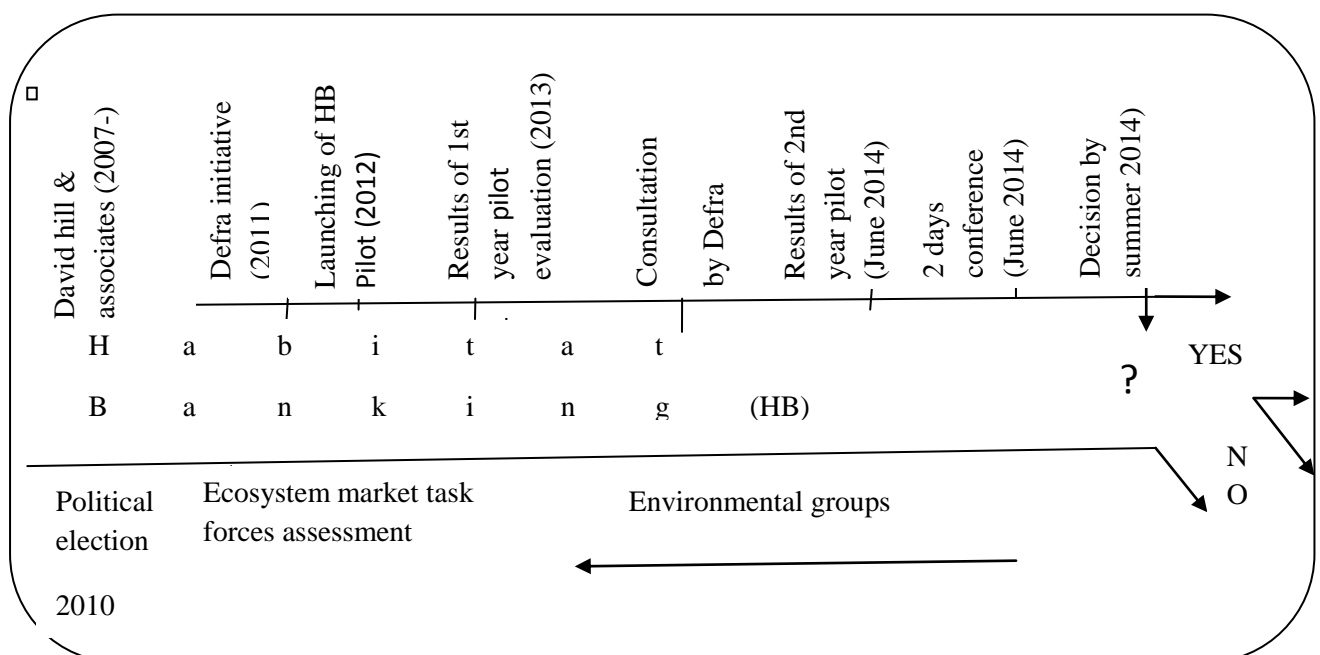


Figure 8: The institutionalizing processes of biodiversity offsets in the UK: .

Source: Defra (2013)

In the process of institutionalizing UK habitat banking, both the private sector and the state are involved. Although many actors are actively participating in the process, the main actors who have the potential to give the final shape to the process is the government represented by Defra.

Table 9: Actor and the roles played in the process of developing biodiversity offsets in UK

Actors	Roles played
Government, Defra,	developing the metric financing the pilot
Environment bank (Private company)	acting as broker, provide offsets participate in number of biodiversity offsets pilots
Collingwood Environmental Planning Limited Institute for European Environmental Policy (IEEP)-	Involved as evaluators of the pilots
Natural England	pilot advisors
Local Planning Authorities	volunteering the pilot
Environmental groups: Friends of the Earth UK, & Save Our Wood s, UK Environmental Audit Committee (EAC)	Opposing the implementation of habitat banking Bringing evidences on the failure of biodiversity in other parts of the world Writing articles and blogs

Source: Defra (2013)

5.5.2.1. Political entrepreneurs' role

Starting from 2007, Oxford-trained-ecologist David Hill and colleagues was pushing the UK government to consider market-based solution (particularly conservation banking) to stop biodiversity loss. Hill was blasting emails demanding UK environmental authorities in taking action toward the massive biodiversity loss. He based his arguments by providing evidences from Lawton et al. (2010) report to the UK government titled "Making Space for Nature". Based on the report, only in his life time, Hill (56) says, 97% of tree sparrows, 97% of the semi-natural grasslands, 93% of the butterflies, 85% of the turtle doves, and 50% of the ancient woodlands are lost (Kenny, 2010). Hill added, results of the "Making space for Nature" are a clear proof to the ineffectiveness of the current UK biodiversity conservation system and it is time for another approach - market based solution. To give scientific publicity Hill and colleagues wrote an article in the journal for Nature Conservation titled "Habitat banking-how it could work in the UK". In their article, Hill and colleagues advocated the potential behind mitigation banking in bringing desperate parties together.

After the conservative coalition parties won the 2010 election, the government was looking for ways in which the UK economy can grow competitively. Then it was immediately Hill's idea of conservation banking to come in agenda, and he was getting response from government's authorities and attended 6 workshops with top government officials. Hill and colleagues together with landowners, farmers and conservation land-management companies are looking for a sponsor to provide capital required to set up habitat banks. They have already established partnership with the wildlife trust fund (Ecosystemmarketplace, 2013). Hill says there are some people who criticize the idea of making money from conservation, but I think that is why we are failing to protect it.

5.5.2.2. The role of the government (Defra)

The department of environment, food and rural affairs (Defra) is actively engaged in institutionalizing the habitat banking in the UK. The main argument behind the introduction of biodiversity offsets is that, biodiversity offsets is believed to have a potential to solve the twin challenge of economic growth and biodiversity conservation the UK is facing today. Defra is using the Australian experiences as a model in introducing biodiversity in the UK. Peterson, Secretary of state in Defra, praise habitat banking in Australia as providing useful evidences in a press conference to the commons environmental audit committee (EAC). He mean, the habitat banking reliefs the burden to planning and ultimately proved to be less expensive than conventional conservation instruments. As a proof he showed that 80%

reduction in applications to build on grassland was observed in Australia since the introduction of habitat banking. Therefore, Paterson says:

“Our economy cannot afford planning processes that deal with biodiversity expensively and inefficiently or block the housing and infrastructure our economy needs to grow [and at the same time] our environment cannot afford the wrong type of development which eats away at nature” (Defra, 2013 p: 1).

According to Defra (2013) the process starts with giving mandate to the ecosystem market force for economic assessment of biodiversity. Based on the result of the assessment, piloting the offsets was launched in July 2012. The main aim of the pilots is to help make informed decision about the introduction of biodiversity and develop governance strategies to be used in the actual implementation biodiversity offsets across England.

Biodiversity offsets: pilots: In testing biodiversity offset feasibility, some counties in the UK are volunteering to pilot biodiversity offsets. According to Kilner (2014, personal communication), currently six biodiversity offsets pilots running on a voluntary basis . The pilots are planned for two years. The pilots started in July 2012 and are expected to come into completed evaluation in June 2014.

The six pilots are::1. Coventry, Solihull and Warwickshire. 2. Devon (including three sub-pilots North, South and Heart of Devon). 3. Doncaster. 4. Essex. 5. Greater Norwich. 6. Nottinghamshire.

How the pilots work: The piloting is contracted by the intermediary, environment bank. The process goes as follows:

Step 1: The pilots are started with creating database for landowners who want to put their land into the biodiversity scheme to receive conservation credits.

Step 2: looking for third-party investor to provide capital required to set up habitat banks with landowners, farmers and conservation land-management companies.

Step 3: identify developments within the pilot region, determine their mitigation requirements and encourage local authorities to test out their credit mechanism.

Step 4: developing a regulatory market

What is unique in the UK biodiversity is that it is the market which is expected to general the regulation for biodiversity offsets. it will be done based on the results of the pilot and the consultation paper.

The pilots are taken as a learning tool in the process of institutionalizing biodiversity offsets and aimed to achieve specific objectives at different stages. Evaluation of the pilot will be done based the objectives of the pilot as in the box below.

In 2013 assessment of the ongoing pilots was done, the objective of the assessment was to see the first two stage of development.

Stage of the biodiversity offsets pilot assessment in the UK

Stage 1: Setting up of the pilot;

Stage 2: Development of the pilot biodiversity offsetting strategy;

Stage 3: Individual development projects and associated offsets: including the identification and accreditation of offsets providers and engagement with developers; development of legal agreements, formal approval and monitoring arrangements; and use of the metric around specific development projects.

Stage 4: A review of existing planning cases in which biodiversity has had an impact to test whether the consideration of biodiversity has increased project time, reduced the number of sites available for development or reduced net developable area of sites that have been given planning permission and present information gathered in a form suitable for incorporation into a government economic impact assessment.

Source: Personal communication Kilner (2014),

The metric used in the pilots: The metric is a tool used to calculate biodiversity units of development impacted area and the biodiversity units created or restored in an offsets area. This is calculated in terms of number of biodiversity units per hectare.

A biodiversity unit is defined as product of the size of an area, and the distinctiveness and quality of the habitat it comprises.

Distinctiveness is explained by how rare a species is. A very rare species have normally high distinctiveness.

Table 10: The pilot metric developed by Defra

Value of 1 ha in “biodiversity units”		Habitat distinctiveness		
		Low (2)	Medium (4)	High (6)
Habitat quality	Good(3)	6	12	18
	Moderate(2)	4	8	12
	Poor (1)	2	4	6

According Defra (2013), the pilots are more about evaluating than revolutioning biodiversity offsets and are set basically to test voluntary offsetting.

Finding of the pilots (after one year): according to Kilner (2014, personal communication) so far, only the first two stage in the assessment stages are done and finding for stage 3 and 4 are expected in the summer of 2014

Governance: From the one year assessment of the pilot, the numbers of organisations involved in each pilot varies from 2 to 22 and a wide range of ecological, procedural and spatial planning expertise appears to be necessary for the effective delivery of the offsetting strategy Kilner (2014, personal communication). However, the pilots have produced a range of governance structures that appear to be viable, fit for purpose and some of the pilots produced an advanced draft of “offsetting strategy”. The pilots also showed for biodiversity offsets to be fully functional, critical mass planning authorities who will voluntarily try offsetting is needed and this must come mainly from the state through federal governments (Defra, 2013). The lack of suitable biodiversity offsetting projects coming forward to date is noted and should be considered as a significant finding in itself. The need for wide range of ecological, procedural and spatial planning expertise was one of the

important finding of the pilots pilots have established a good degree of coordination among the actors notably but some of the challenges like ‘in perpetuity’, ‘additionality’ and the involvement of communities are insufficiently explored at this stage of evaluation.

Consultation by Defra: After examining ecosystem market task force assessment results and the interim report results from pilots, Defra launched a consultation paper which was open from 5 September 2013 until 7 November in 2013 (Defra, 2013). According to Defra (2013), the consultation is designed in a way that can explore answers to the following three objectives:

If biodiversity offsets can improve delivery of planning requirements - quick, cheaper and more certain for developers.

- If biodiversity offsets can ensure the metric assessed at development site equals the metric created in achieving “no net loss” or may be net gain if offsets enhance ecological networks.
- If biodiversity offsets do not incur additional cost to business / do not increase the net burden to developers.

The consultation paper poses a total of 38 questions to stakeholders, developers, offsets providers and the public in finding relevant answers to the above mentioned objectives.

Feedbacks from consultation paper will be important in deciding whether to adopt biodiversity offsets all over England or reject it (Defra, 2013; Kilner, 2014). According to (Defra, 2013; Kilner, 2014), if the decision favours adoption of biodiversity offsets, then regulatory will proceed in preparing a detailed regulation under section 40 Natural Environment and Rural Communities Act 2006. Then, the final product will be setting up a system to facilitate biodiversity trade .

Although the government and some private companies like environment bank are pushing for introducing biodiversity offsets as policy instrument for the conservation of biodiversity nationwide, there are however some environmental groups who are skeptic to the government plan.

5.5.3. The position of environmental groups

Environmental groups like the Royal Society for the Protection of Birds (RSPB) and Friends of the Earth UK and Save Our Woods UK are skeptic of the policy of offsetting in the UK and oppose the policy as just backfire to allow more biodiversity loss as it gives licence developers to even impact sites of special scientific interest (SSSI).

These groups fundamentally question biodiversity offsets for its lack of convincing evidence about the effectiveness of the system. (The UK government did not give details of the Australian native vegetation banking system, which the government is taking as a model). There are evidences (M. Maron et al., 2012; Quétier & Lavorel, 2011) that the biodiversity offsets has been a failure in many cases. Environmental groups mean (Hen, 2013) the government is using biodiversity offs as a back door to speed up planning and bringing more land under development. Inherently Ecosystem services are far more complex to be reflected

in an offsets metric, it is not possible to capture ecosystem services of the area, as systems are that govern biophysical activities of an ecosystem is highly interdependent (Morris, Alonso, Jefferson, & Kirby, 2006). According to view of the environmental groups, even if biodiversity offsets is accepted in theory, it is not realistic enough to be implemented, unproven and unreliable solution to biodiversity conservation.

Trying to offsets the irreplaceable nature of some species (400 old native trees) and loved wildlife area for compensation to be carried out somewhere else is losing local community right to enjoy nature.

An apple cannot be an orange. According to the Friends of the Earth philosophy, the wetland banking in the USA cannot be a forest in the UK, and trying to replicate the wetland banking of the US system is highly impractical in the UK.

To understand the positions of the two salient actors in the institutionalization of biodiversity offsets, I will try to summarize the argument present by both those pushing for adoption of the policy (Defra) and those strongly opposing its adoption (Environmental groups)

Table 11: The two positions on the institutionalizing biodiversity offsets in the UK.

Government position, as represented by Defra	The environmental groups position
Bringing biodiversity to the market can help realize societal understanding on the value of biodiversity and then can take initiative to conserve them	The intrinsic and societal value of “nature” can never be properly captured; it is beyond the market. Biodiversity offsets lack the socio – ecological relationships
Biodiversity offsetting is in practice both in the USA & Australia; we can take advantage of the experiences in implementing the system here in the UK.	Evidences from Australia are not convincing enough and can’t be used as part of the decision making process. Environmental experts, such as gibbnswho actively worked for offsets are disappointed with results
Biodiversity offsetting can help planning to be more effective and less bureaucratic , it is extremely flexible instrument	biodiversity offsetting is only a liecence to trash nature It is a back door to bring more land for development in return to cheaper lands elsewhere
Biodiversity offsets enables developers to transform a habitat as long as they offsets it with equal biodiversity unit to compensate impact	Nature is irreplaceable; biodiversity offsets principle overlook the intrinsic functions in biodiversity , Local communities (on the development side) can loss a valuable ecosystem service for elsewhere
Six pilots in progress to about biodiversity offsets and support decision making	Two year life time, to get trusted results on the complex nature of biodiversity

Source: Defra (2013); Friends of the Earth (2013)

As a response to the opposition, the Friends of the Earth give some alternatives measure to biodiversity conservation. This includes among others the issue of right based community level biodiversity governance, community level training and capacity building and strengthen legal support in a way that can give local people the right to protect their land and livelihood activities.

6. Conclusions

Biodiversity offsets are being used as a mechanism in delivering "no net loss" target in biodiversity. The recommendation is, offsets to be used as a last resort of the mitigation hierarchy (efte et al., 2010; Madsen et al., 2010; Ten Kate et al., 2004). Primarily, offsets result from compliance to existing legislation, but there are voluntary initiatives as well. The main actors who directly involve in biodiversity offsets activates include: local or district authorities, regulators or protection authorities, land owners, developers, intermediaries and conservation specialists or ecologists.

Based on analysis of the registered biodiversity offsets programs this study identified three types of biodiversity offsets programs. These are compensation; one-off offsets and the banking. According to Ecosystemmarketplace (2013), developers can in practice combine the three offsets types. The common combinations include: compensation and one-off offsets, banking and one-off offsets, and all the three together.

The analysis of the biodiversity offsets programs, shows offsetting interaction appears in three distinct mechanisms. The first is regulatory compliance, in which an allowed impact to biodiversity is set -"a cap". Here, if developers exceed the limit, then the market resolves the cost of offsetting the impact. This is the case in the Brazilian forest code and environment certification in Paraguay (Ecosystemmarketplace, 2013). Another possible way is the government mediated market, where governments or non-profit organizations act as buyers of biodiversity reserve by purchasing or providing land for offsetting activities or do the offsetting or simply creating payment for biodiversity stewardships. The third is market regulated offsetting in which multiple buyers and seller interact via trade, and in most of the cases with help of intermediaries which function as brokers. The banking also called habitat banking identified as a offsets programs which is typically defined by the characteristic of a market — a situation where buyers (developers) and sellers (land owners or conservation organizations, or the government agencies) interact via trade (Bayon, 2008; Ecosystemmarketplace, 2013). In my primary governance structure analysis only 3 of the total 55 offsets programs show a true market characteristic, 34 fall under the one –offsets and 9 offsets programs follow the compensation. The compensation and one –off offsets, in most of the cases don not satisfy the characteristics of a true market.

My analysis further found revealed, the offsets types are results of biodiversity legislative framework in their respective country (Doswald et al., 2012). The legislative framework include: environmental impact assessment regulations, species and habitat legislations and compensation regulations. One off offsets is the common offsets programs used by countries identified in the research. The main reason for this is because almost all countries have already introduced the environmental impact assessment regulations. Another possible reason is one-off offsets is less complex, only the regulatory and land owners directly interact in offsetting. Consistent with what Bayon and Jenkins (2010); Vatn (2013) says, the market observed in biodiversity offsets is a government regulated market, and its creation are highly dependent on the public body either through the “cap and trade” or other forms compliance depending which type of legislative framework is practice in a country. Therefore the government plays a central role in creating market for biodiversity offsets

Biodiversity offsets provide a new opportunity for controlling the rate of biodiversity loss. On one hand the loss we are losing biodiversity is tremendous, an evidence by itself which shows that something is wrong with the current system of biodiversity conservation. On the other side, we lack evidence showing the superiority of biodiversity offsets over the conventional methods. It may have a profound impact on governance of biodiversity all the way from local to global scale. The argument that support the instrument revolves on its potential in achieving measurable outcomes, make development possible while conserving biodiversity, incorporating biodiversity into economic models of countries, reduce conflict among stakeholders, establish collaborative relationships, and its potential in reducing budgetary burden to the public as biodiversity offsets overriding principle is polluter pays principle.

On the other side, biodiversity is heavily criticized by environmental experts and non-governmental organizations. the common criticism are inability of created biodiversity in an offsets to capture the ecological structure, function and services of biodiversity loss due to the impact of development (Burgin, 2010; Kiesecker et al., 2009). This is what we call lack of ecological equivalence or deficiency in like- for- like offsetting. Others such as Clare et al. (2011) and Maron et al. (2012), critic offsetting for being used by developers to get access to land they want to develop - a license to trash nature. This means, development projects that would have been rejected without offsets can be allowed to impact areas of rich biodiversity or for jumping to offsetting without trying to avoid, mitigate or restore one the get their application for development is accepted by authorities. Therefore according to the authors biodiversity is simply to increase chances of damage to biodiversity.

In the UK, institutionalizing biodiversity offsets as a policy instrument for the conservation of biodiversity depends on two things. One, an economic growth plan of the ruling party driver to the emerging policy on biodiversity offsets. The second is the establishment of an intermediary who takes a broker role to provide biodiversity offsets in UK. This intermediary is a private company called environmental bank, run by political entrepreneur who has been pushing the government of England for considering the market for the conservation of biodiversity. Together with Defra, environmental bank is involving in six voluntary pilot projects to test biodiversity offsets.

The department for environment, food and rural affairs (Defra) is mandating the process of introducing biodiversity offsets. To test biodiversity offsets, six pilots are running for two years, starting July 2012 and final results are expected in summer 2014.

While the pilots are running, to get feedbacks from stakeholders, Defra has launched a consultation paper in the period between September and November in 2013. Based on results of the pilots and the feedbacks from the consultation paper, the government will decide either to adopt or reject the introduction of biodiversity offsets in the UK. So far the initiatives are voluntary, no rule or directives in which the offsets base. If the final decision favors biodiversity offsets, the policy will be enacted under section 40 of the natural environment and rural communities' Act 2006 and Defra will proceed in preparing detailed regulation on how the market will function (Defra, 2013).

No evaluation as to the effectiveness biodiversity offsets programs is presented in this work, neither was the objective of the work. What I want to comment on the process of institutionalizing biodiversity offsets is that, the design of institutional framework in biodiversity offsets should not be vulnerable to capture interest of special groups or individuals in a community by directing conservation against the overall social interest.

What is fundamental in biodiversity offsets is to follow strictly the mitigation hierarchy (avoid, minimize, onsite mitigation/restoration and offsets). Another important concept worth considering is what is called the "limit to offsets" (BBOP, 2013; Pilgrim et al., 2013). This mean not all species or habitat can be offsets. There are special cases that offsets is not allowed. For example for extremely rare species and species that takes extremely long time until benefits of offsets start giving ecosystem services.

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Appendix 1: List of biodiversity offset programs

Biodiversity offsets programs in USA and Canada

	Program	Associtated bank/project	Regulator information	Offsetting Principle	Status
1	Fish Habitat Compensation (Canada)	Irish Cove Brook Bank, Big Lake Bank & Margaree River Bank	Fisheries and Oceans Canada	no net loss(One- Off Offset)	Active
2	Aquatic Compensatory Mitigation (US)	Cheverie Creek Habitat Bank			
3	Wetland Restoration/Compensation Guide (Alberta)	N/A	Government of Alberta - Environment	Combination (One-Off Offset, Compensation)	Active
4	WalMart's Acres for America	N/A	Voluntary	One-Off Offset	Active
5	Habitat Credit Trading System (US)	N/A	US Fish and Wildlife Service	Banking	Active
6	Conservation Banking (US)		US Fish and Wildlife Service, US National Marine Fisheries Service	Combination (One-Off Offset, Compensation, Banking)	Active
7	Bay Bank Multi-Credit Watershed	N/A	N/A	One-Off Offset	In-

	Market				progress
8	Forest Conservation Act (Maryland)	N/A	Department of Natural Resources Forest Service (Maryland county)	One-Off Offset	Active
9	Wetland compensation agreement between Manitoba Infrastructure and Transportation agency and Manitoba Habitat Heritage Corporation	N/A	Manitoba Infrastructure and Transportation agency	Compensation	Active
10	Willamette Multi-Credit Watershed Market	N/A	Multiple agencies: US Army Corps of Engineers, US EPA	One-Off Offset	Active
11	Riparian Buffer Mitigation Program (North Carolina)	N/A	North Carolina's Ecosystem Enhancement Program	One-Off Offset	Active
12	US Bureau of Land Management Mitigation Policy	N/A	U.S. Bureau of Land Management	One-Off Offset	Active
13	Recovery Credit System (US)	N/A	US Fish and Wildlife Service	One-Off Offset	Active

Biodiversity offsets programs in Australia and New Zealand

	Program	Associated bank/project	Regulatory information	Offsetting principle	Program status
1	BioBanking (New South Wales)	- Brownlow Hill Pty Limited BioBank - Corporation of the Society of the Missionaries of the Sacred Heart BioBank	BioBanking Team, Department of Environment and Climate Change	Combination (One-Off Offset, Banking)	Active
2	Koala Offsets (Queensland)	N/A	Department of Environment and Resource Management	One – Off Offset	Active
3	Environmental Offsets (Western Australia)	N/A	Western Australia Environmental Protection Agency (WA EPA)	One – Off Offset	Active
2	Biodiversity Offsets (Queensland)	N/A	Queensland Government Department of	One – Off Offset	In-progress

			Primary Industries and Fisheries		
3	Marine Fish Habitat Offsets (Queensland)	N/A	Queensland Fisheries Service, Department of Primary Industries	Combination (One-Off Offset, Compensation)	Active
4	Regional Planning Offsets (Queensland)	N/A	Queensland local government authorities	One – Off Offset	In-progress
5	Vegetation Management Offsets (Queensland)	N/A	Department of Environment and Resource Management	One – Off Offset	Active
6	Biodiversity Offsets (Tasmania)	N/A	Tasmania Government Department of Primary Industries, Parks, Water and Environment (TAS DPIPWE)	One – Off Offset	Active
7	BushBroker (Victoria)	- Habitat bank with LOTs (Bushbroker)	Victoria Department of Sustainability	One-Off Offset	Active

		- Scattered Trees Offset Bank (Bushbroker)	and Environment		
8	Native Vegetation and Scattered Tree Offsets (South Australia)		South Australian Government Department of Water, Land and Biodiversity Conservation	Combination (One- Off Offset, Compensation)	Active
9					

Biodiversity offsets programs in Europe

	Program	Associated Bank/project	Regulatory information	Offsetting principle	Program status
1	Environmental Liability Directive (EU)	N/A	Environment Directorate-General of the European Commission	Compensation	Active
2	Environmental Offsets (Sweden)	N/A	Swedish County Administration Board (Lansstyrelsen)	One – Off Offset	Active
3	Biodiversity Offsets (UK)	N/A	UK Department of Environment, Food, and Rural Affairs	One – Off Offset	Active
4	Pilot Biodiversity Bank (France)	N/A	N/A	Banking	Active
5	Impact Mitigation Regulations (Germany)	N/A	Federal Ministry for Environment, Nature Conservation and Nuclear Safety	Compensation	Active
6	EU Habitats and Birds Directives	N/A	N/A	One – Off Offset	Inactive

Biodiversity offsets programs in Asia

	Program	Associated Bank/project	Regulatory information	Offsetting principle	Program status
1	Saipan's Upland Mitigation Bank	N/A	US Fisheries and Wildlife Service, US National Marine Fisheries Service	Banking	Active
2	Biodiversity Offsets Study Group (Japan)	N/A	N/A	One-Off Offset	In-progress
3	Malua BioBank (Sabah)	Malua BioBank	N/A - voluntary, but the public-private partnership involves the Sabah Forestry Department, and transparency of transactions is provided by third-party registry provider Markit	Banking	Active
4	Third-party mitigation system (Sabah)	N/A	Sabah State Government of Malaysia	One-Off Offset	In-progress
5	Forest Vegetation Restoration Fee (China)	N/A	County or higher level forest management authorities	Compensation	Active
6	Multiple developments regarding biodiversity offsets in Indonesia	N/A	N/A	One-Off Offset	In-progress
7	TNC's Development by Design Pilot in Mongolia	N/A	N/A	One-Off Offset	In-progress
8	Biodiversity Law that covers Compensation for Damage to Biodiversity (Vietnam)	N/A	Ministry of Natural Resources and the Environment (MONRE)	One-Off Offset	In-progress

Biodiversity offsets programs in Africa

	Program	Associate bank/project	Regulatory information	Offsetting principle	Program status
1	Environmental Action Plan (Madagascar)	N/A	National Office for the Environment	One-Off Offset	Active
2	Draft Biodiversity Offset Policy (Uganda)	N/A	Uganda Wildlife Authority (UWA)	One-Off Offset	In-progress
3	Draft National Offsets Framework (South Africa)		Deputy Director-General: Biodiversity And Conservation	Combination (One-Off Offset, Compensation)	In-progress

Biodiversity offsets programs in Central and South America

	Program	Associated bank/project	Regulatory information	Offsetting principle	Program status
1	Industrial Impact Compensation (Brazil)	N/A	Brazilian Institute of Environment and Renewable Natural Resources	Compensation	Active
2	Environmental Services Certificates (Paraguay)	N/A	N/A	compensation	Active
3	Forest Code Offsets (Brazil)	N/A	Brazilian Institute of Environment and	Compensation	Active

			Renewable Natural Resources		
4	Conservation Trust (Paraguay)	N/A	Instituto de Derecho y Economia Ambiental	Compensation	Active
5	Environmental Licensing (Colombia)	N/A	Ministry of Environment or local environmental authority (Corporaciones)	One-Off Offset	Active
6	Environmental Impact Assessment Law and Environmental Compensation Fund (Argentina)	N/A	Secretariat for the Environment and Sustainable Development (SAyDS)	Combination (One-Off Offset, Compensation)	Active
7	Environmental Impact Assessment Law (Costa Rica)	N/A	National Environmental Technical Secretariat (SETENA)	One-Off Offset	Active
8	Program for Environmental Restoration and Compensation (Mexico)	N/A	*PROFEPA and *CONABIO	One-Off Offset	Active

Appedex 2: List of people contacted

John Kilner	Protection of Species & Habitats Hub, Defra, UK
Joost Bakker	Programme Manager, Global Nature fund, Germany
Kerry ten Kate	Director, Business and Biodiversity Offset Program, USA
Nathaniel Carroll	director, Biodiversity and water activities and market-crosscutting projects, USA
Steve Zwick	Managing Editor Ecosystem Marketplace, USA



Norwegian University
of Life Sciences

Postboks 5003
NO-1432 Ås, Norway
+47 67 23 00 00
www.nmbu.no