Eco Currency

AN ENQUIRY INTO BALANCING ENVIRONMENTAL AND ECONOMIC ECOLOGIES.

Department of Industrial design, Eindhoven University of Technology

Next Nature theme

Design research team

Marcel van Heist BSc

Jop Japenga BSc

Billy Schonenberg BSc

Coach dr. Koert van Mensvoort MSc, MFA

Initiator of the project and coach of the students throughout the project.

Client Luna Maurer MFA

Her main interest was to see how this project could be implemented in prototypes and tested on a small scale. Ethical questions about putting a price on the environment was a clear focus as well.

June, 2010

Special thanks to:

dr. Koert van Mensvoort MSc, MFA

Luna Maurer MFA

other members of the think tank at the Paralello conference Sao Paolo, April 2009

dr. Olav Velthuis

Peter van Oudheusden MSc, MPhil

Christian Bogmans MPhil

Jan Stoop MSc, MPhil

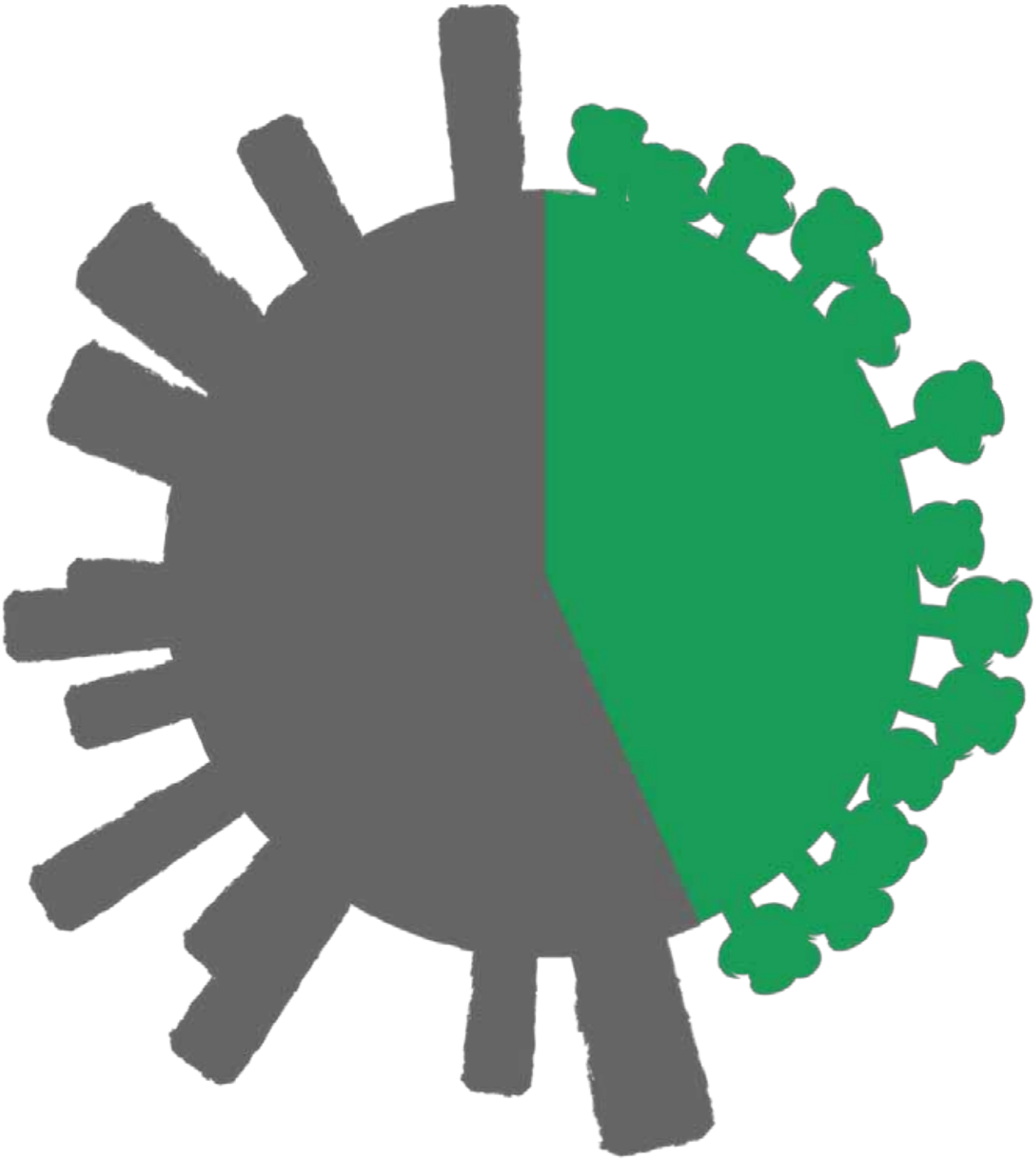
David Morgan

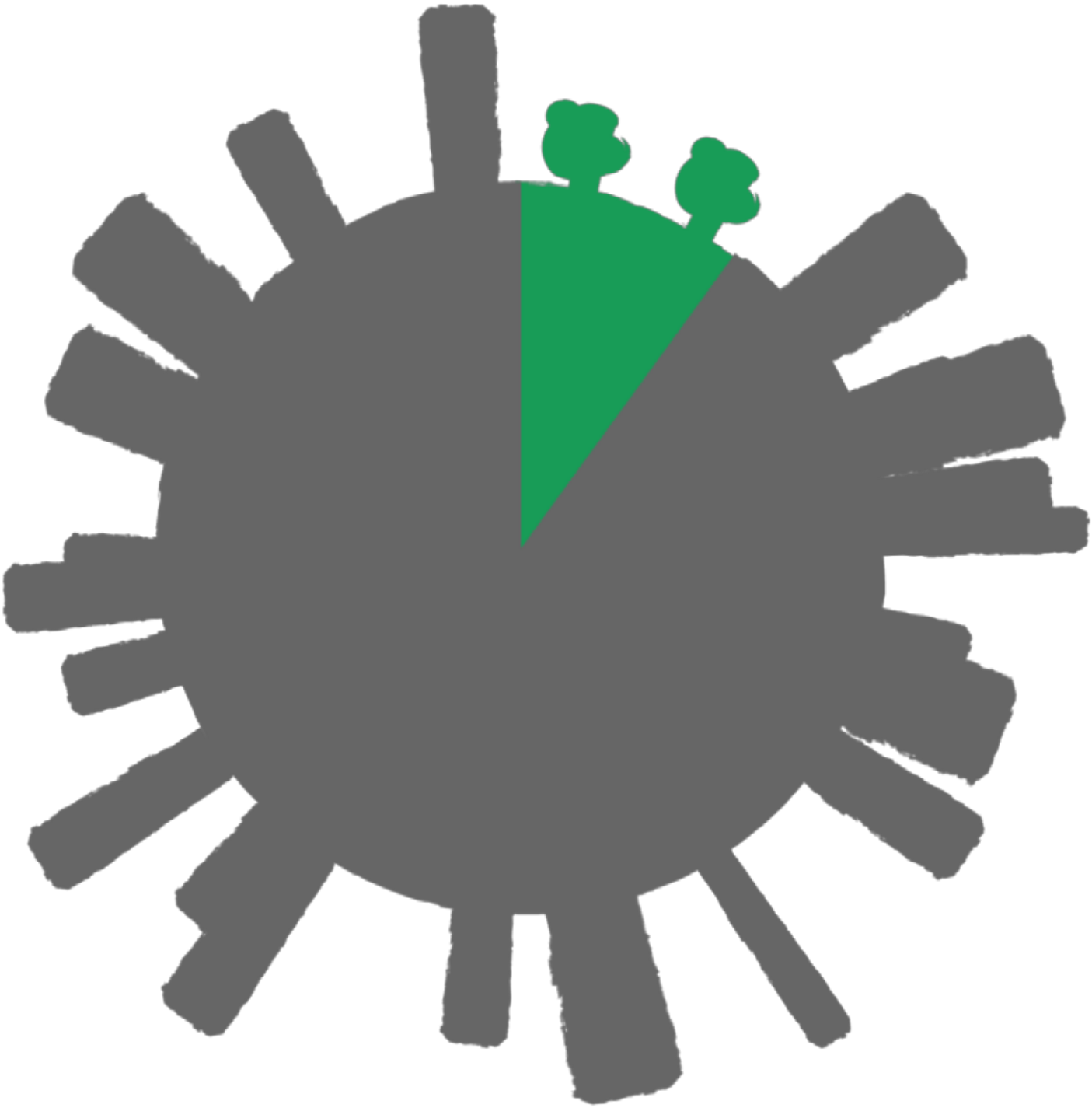
Sean Lynch

Abstract

The ECO Currency project originates from the hypothesis that an important factor in our current environmental crisis is the disconnect between the economic ecology and the environmental ecology. With the latter the ecology of plants, animal and other organic material is meant, whereas the economic ecology is defined by our financial system of market with money and goods. Environmental issues could be addressed by linking these two spheres in a better way.

Eleven research questions have been formulated to investigate the possibilities of such concepts. After an exploration of related topics, three scenario's have been presented to experts. This research resulted in a new connection of complex discussions. All explorations are translated in a single proposition. This report describes the background theory. Three key recommendations for future actions conclude the project.





The bigger the economic ecology, the smaller the environmental ecology, in this project we aim to link the two, making sure that the geosphere and biosphere, the very foundation for human existence on earth, are actually valued in our economy.

Table of contents

1. Introd

uction

Since our planet came to exist, it took about a billion years to form a biosphere of life around its geosphere. This life influenced and depended on the geosphere to form a perfect balance. Another three and a half billion years and this balance between life and the elements evolved into us, mankind. We created a new sphere, dynamic and autonomous, full of human ecosystems. This new sphere in turn influences and depends on previous spheres, a balance is yet to be found.

One such influential human ecosystem is our economy. The way it is currently based on credit requires it to continuously grow. This growth feeds on energy and material, our environment. However, we live on a planet with limited resources. If we choose to keep our current economy growing, we will eventually run out of resources. In other words, the bigger the economical ecology, the smaller the environmental ecology.

We aim to link the two ecologies, making sure that the geosphere and biosphere, the very foundation for human existence on earth, are actually valued in our economy.

During a brainstorm session at the Paralello conference in São Paulo (April 2009), the idea for a separate ECO-currency emerged. Artists, designers and scientists from The Netherlands, The United Kingdom and Brazil thought of this as a new way to connect the environmental and economic ecologies. These ideas form the foundations of this research.

Design brief

As stated by Koert van Mensvoort

The starting point of the ECO-Currency project is the hypothesis that an important factor in our current environmental crisis is the disconnect between the economical ecology and the environmental ecology. With the latter we mean the ecology of plants, trees, animals, and other organic material. Whereas the economical ecology is defined by our financial system of market, money, goods and other economical exchange. Our second working hypothesis states that we could address environmental issues by linking the economical sphere and the environmental sphere in a better way than currently the case.

Before diving into an analysis we should address the question whether it is necessary to be critical of addressing ecology as metaphor or structure vis a vis ecology as an organic threatened living environment that we are part of? Especially traditional environmentalist might object to describing both spheres as 'ecologies', and argue it is inconsiderate to use the same term for a man–made system as well as for the older and deeper organic ecology of nature. Surely they have a point here: the environmental ecology is not only much older than the economical ecology, it also presides it in the sense that the economical ecology cannot exits without the environmental ecology. On the other hand we must realize that, while the environmental ecology is threatened, the economical ecology is currently the most threatening one. Hence it should be taken seriously and not be waved aside as simply a man-made structure.

The fact that most people, at least in the western world, nowadays worry more about the financial crisis and their mortgage rates, than about hurricanes or floods exemplifies that the economical ecology has increasingly become a 'next nature" with its own dynamics and autonomy. Like a true nature, it can be benevolent and kind as well as wild, cruel and unpredictable.

Research Questions

How and by whom should the ECO Currency be introduced?.

Can it be introduced locally or only globally?

How to fund it?

Are we ready to make environmental value explicit?

What is counted as environmental value?

How to administrate?

How do we limit corruption?

How does the ECO fluctuate and relate to other currencies?

What can we learn from existing CO2 or ecosystem trading systems?

How will economic and moral incentives blend?

How and where should the ECO currency be promoted?

Methodology

As a team of design researchers it is important to look for ways in which valuable contributions can be made. Not as economics, not as environmentalists, but as designers. New and possibly naive to this topic, the aim is to form a birds eye perspective on ongoing discussions surrounding the debate, using design methods to structure them, create new insights and communicate these to a wider public. Because of the design background, the team is not limited by one field of study involved, still able to communicate with experts and read literature from the several fields of study involved.

Exploration

Starting the project, it was key to broaden the view on the concept and explore all related issues and their possible roles. The eleven questions as listed in the brief were used as guides through the different topics surrounding the eco-currency.

In order to create a birds eye perspective on the area, as many sides of the several discussions as possible had to be reviewed. To structure all the different sources a blog was created on which articles, presentations, movies etc. were summarized and tagged according to the eleven questions. In regular discussions the team communicated and updated their view on how the eco currency would work.

Scenarios

Once an overview of the research questions was clear, several scenarios were created that answer the questions in different ways. These scenarios were then discussed with economic experts to validate some of the assumptions made and to check their relevance.

This approach is similar to existing scenario-based, expert validation methods used in other fields of design. The aim is to quickly communicate ideas about a system in a form that allows for several aspects to be evaluated independently. Scenarios often clearly imply implications of design decisions and therefore they easily raise many questions at different levels[1], thus critically assessing their relevance.

Proposition

In order to get a scope of future steps to be taken, a final proposition was made. It makes research outcomes explicit and thus allows for explicit future effects to be anticipated. This is a less abstract outcome of the design research and allows for communication to a wider audience. Furthermore, it paves the road for reflection, generalization and eventually conclusions to be drawn.

1 Rosson, M.B. & Carroll, J.M. (2002), "Scenario-Based Design", Chapter 53 in J. Jacko & A. Sears (Eds.), The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies and Emerging Applications. Lawrence Erlbaum Associates, 2002, pp. 1032-1050.

The aim of this project is to research the possibilities for an eco currency, a new way to link the environmental and economic ecologies. This concept, as born at the Paralello conference in São Paolo, is based on strong insights but was initially rather inexplicit.

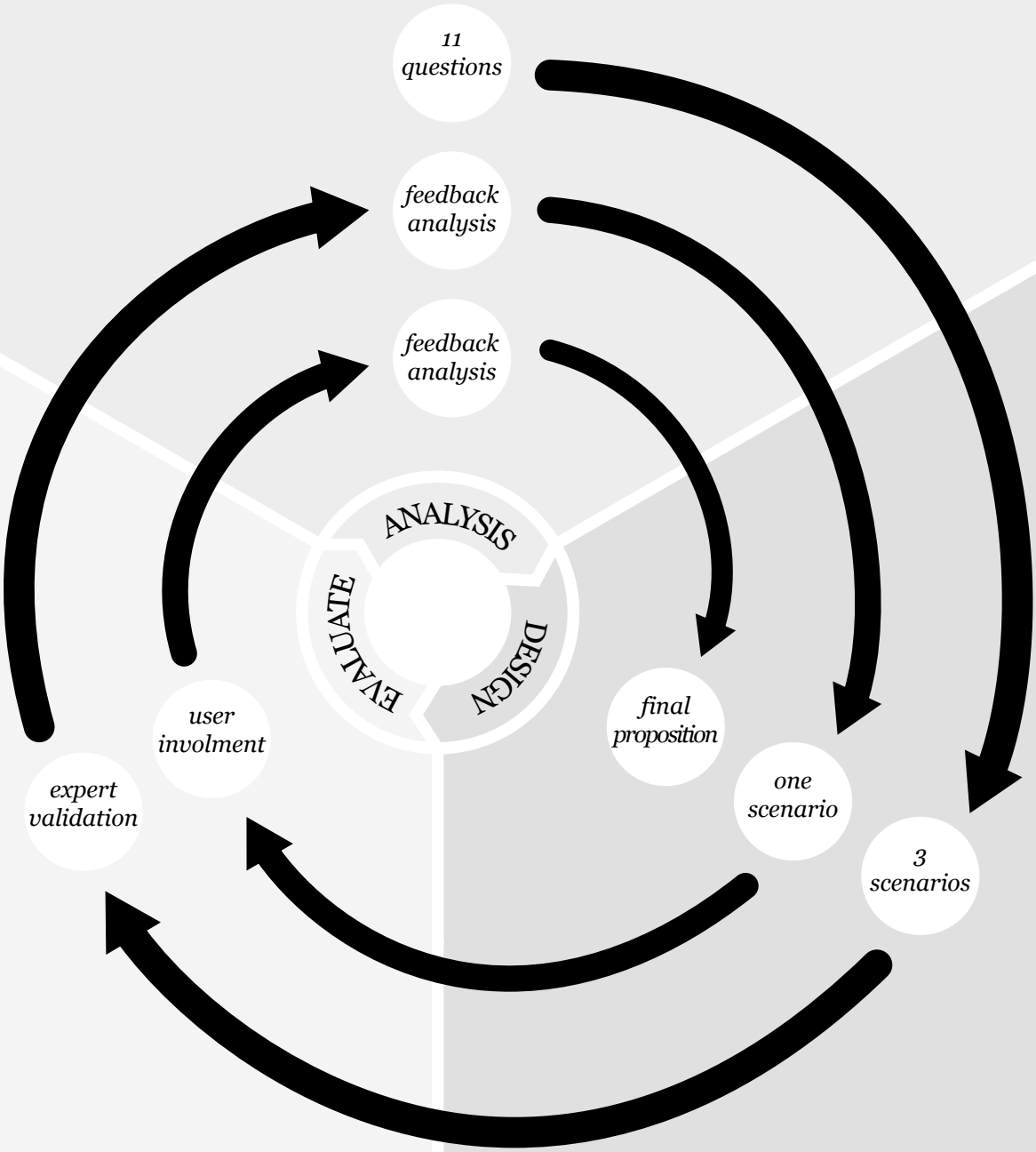
Three important objectives for this follow-up research project are:

1 *Identify and tackle questions surrounding the concept of an eco currency.*

2 *Create different scenarios in which such a concept could be realized.*

3 *Suggest future steps for it to be realized.*

The methodologies used to work on these objectives are described in this chapter, the three main parts of this report coincide with these objectives.



Visualisation of our design research process.

2. Explo

ration

Although the problem as stated in the brief is very apparent and urgent, working towards a better understanding of the subject reveals its many unspecified faces. Guided by eleven research questions the outlines of this project were explored. Since these fields were rather new to the research team, all types of sources were used to quickly get acquainted with the current discussions. Various related crash courses, presentations, documentaries, films, articles, papers and books were consulted in this exploration.

After these initial finds, a more structured approach through related fields of study focused on more specific experts and sources. The research questions were tackled individually and their borders became clear. This section of the report describes the separate questions as stated in the project brief and provides an overview of their relevance to the eco currency project. Next to creating a base of knowledge, it also provides a review of the questions themselves.

How and by whom should the ECO Currency be introduced?

Organization

An essential question to be asked when a connection between the economy and ecosystems is made will be about who initiates this shift. The question of how to organize such a fundamental change in the way humanity values its environment will greatly influence the success of such a proposal. Different possible answers will lead to a difference in approach, scale and feasibility on several layers of the concept and will greatly influence all other research questions involved in this enquiry. Several possibilities of how to organize will be discussed looking at relevant examples.

Governments

Many existing markets in biodiversity and water have been introduced by national or local governments[2]. One of their great advantages lies in their ability to fund such initiatives and use legislation to do so on both regional and federal levels. Several examples in Latin America use a tax or exclusion from taxes to create economical incentives to participate. Although this is an important way of getting money- and has been very important in the protection of biodiversity up to date- it does not coincide with the principles of a free market quite yet. These attempts do not let society determine the actual value of environmental assets by forces of supply and demand.

A number of different examples like the 'grain for green' (SLCP)[2] program in China are sometimes misinterpreted as being government-created markets. In this case the government pays farmers to leave their hillsides covered in forests. Although this system does create value for standing forests, the Chinese government is the only possible buyer. Such a monopsony does not link the provider of the environmental service directly to its user. The government determines how much it's willing to pay and again supply and demand do not play a role here.

This issue might be resolved in case of a reversed auction, as the Victorian government has done in their BushTender and EcoTender programs[2]. Even though the state was still the only 'buyer', local landholders were actually competing for government funds. This resulting competition effectively determined the 'best price' at which biodiversity was to be conserved.

The best examples of true markets -with multiple buyers as well as sellers- created by governments however, are the so called 'cap and trade' schemes (like the EU emission trading scheme). Government regulation creates scarcity by setting a limit on the use of a natural resource. Multiple buyers and sellers are then free to negotiate about a reasonable price, provider and user of the environmental service are directly connected.

Perfect as it might sound in theory however, practice turns out to be rather different. Even though the carbon credit market has been steadily growing ever since it was opened in 2005, initial aims concerning emission reductions are not yet met. As James lovelock explains[3], enough scarcity has not been created. The fact that national governments set their own limits and no global consensus could be reached because of political reasons has led to a situation in which governments have been too generous handing out credits in the first phase. Now in the trading phase, there

are simply too many credits to form a serious economical incentive for companies to reduce their emissions.

Cap and trade schemes require tight administration and complex institutions that monitor and enforce the rules. Looking at the trouble the EU had with the introduction of a scheme for the well definable carbon emissions, it is hard to imagine successful versions containing all 'environmental value', even more since some of the countries hosting the most biodiversity already struggle with corruption today[2].

Collaboration

Several signals indicate the benefits of (mostly web based) platforms that allow for a bottom up approach[4]. Main benefits in comparison to traditional, institutionalized approaches are specifically those that seem to hold back existing schemes from a true breakthrough: costs and managing difficulties. Organizational focus should be on the facilitation of actions initiated by others. The platform created should be designed as a self regulating system that allows for growth and improvement.

Own initiatives

It is currently also possible for individuals or companies to organize their own initiatives. The reforestation project as executed by Willie Smits[5] is one such example of a local initiative to preserve and even regenerate biodiversity. Even though this example is started because of moral reasons, it does find economical incentives to continue the project.

In estonia the founding of the bank of happiness[6] is one example of how individuals have initiated a platform for trade. Not a trade in money but one in services that people are willing to offer each other, services that are truly valuable for those using them. Although the platform still depends on moral incentives of people to offer their services it does show how parallel market platforms can easily be created by individuals online.

Conclusion

Looking at some examples of government-organized systems that aim to conserve biodiversity through market mechanisms it is safe to conclude that multiple buyers as well as sellers and a direct link between the two are necessary to allow for these mechanisms to work. Although governments have the power to gain funding and enforce rules, the institutions involved in the administration are often inefficient and sensitive to corruption. New bottom-up approaches to web based platforms might hold a fitting a solution to these issues.

1 Katoomba Group, 2009. beyond carbon: biodiversity and and water markets

2 Vaughan, A. 2009. James Lovelock labels Europe's carbon trading scheme a 'scam'. The Guardian, 10 Mar

3 Shirkey, C., 2008, Here comes everybody: The power of organizing without organizations. Penguin press

4 Smits, W., 2009, Willie Smits restores a Rainforest. Presentation at TED2009

5 Tegenlicht, 2010. Waar is de woede: De wereldeconomie is in crisis, maar waar blijft de woede? VPRO

Can it be introduced locally or only globally?

Scale

This question is very important, because it forms an important backbone in the whole system. There are several projects that are implemented on different scales, some local, some global. Both have their advantages and disadvantages. Some examples follow to point out key differences.

Exploration

Recipes

Willie Smits, a conservationist who works on reforestation, argues that local involvement and implementation is the most important thing for his projects to work[5]. An important conclusion he formulates is that there is not one single solution, or recipe, for all places. Every specific place has different requirements, and the project should fit local culture[5].

Global Tax

Palley discusses the feasibility of a Tobin Tax[7] See page... (chapter in funding). First he opposes the argument of 'jurisdiction shopping' in which opponents of the Tobin Tax state that it will only work if introduced globally, which is hardly feasible. Palley gives a number of arguments why this wouldn't necessary happen. He states that if the Tobin tax would be introduced in e.g. the G-7, the 'Bank of International Settlement's' example shows that introducing guidelines which would make banking more expensive does not mean that banks would shift to jurisdictions where these rules do not apply.

Local

When reviewing the implementation of an actual currency one tends to think that this should be introduced by a global institute like the United Nations. However, in Jakarta something quite the contrary happened. Said Zaimi introduced a new currency: the golden dinar. It keeps it's value and is based on islamic values. It is a local currency.[6]

As these examples show, the question of scale has implications on very different levels. Organization, funding, promotion and involvement are some levels where there can result in big differences.

It is very clear however, that through the use of new technologies, such as handheld devices and the world wide web, local does not necessarily mean local in a geological sense of the word. A local community can also be a group of people who are linked by interest in the same subject and connected over the web. The overlying trend of this technology is that the borders between local and global are fading. Something very local can be accessed by a global audience very easily. Scaling up is made fairly easy.

An example of this is given by Clay Shirky in his talk about institutes and collaboration[8]. His principle is: designing the right infrastructure is a strong way of reaching a goal when contributors are the ones taking the initiative. From a scale perspective, one can conclude that in his examples the contributors can be local, and have no direct ties to the global audience. The platform is merely the enabler.[4]

A similar thing can be seen in a project where an Amazonian Indian Chief and Google collaborated in Google Outreach. Almir Narayamoga Surui is the Chief of a tribe in the Brazilian rainforest. He is nothing like the stereotypical image one might have. He uses new networks and technology, such as an iPhone, Skype and FaceBook to help preserve the forest. Although the chief does operate globally, attending conferences and giving talks, in essence an online platform enables a local community.[9]

Conclusion

In conclusion, new technology makes the line between local and global disappear, and enables possibilities for platforms that links communities. While making models and experiments further on in the project, this is an easy to implement solution which can potentially reach a large audience with small efforts.

t

7 Palley, T.I.,2003. The economic case for the Tobin Tax. Debating the tobin tax

8 Shirky, C., 2005. Clay Shirky on institutions vs. collaboration. Presentation at TED2005

9 Blankesteijn, M., 2010, Rimboevolkjes ontdekken internet, De Pers, 26 Mar. p. 10

How to fund it?

Funding

Maintaining and/or investing in environmental value needs to be economically interesting, it should be able to provide the stakeholders involved with economic means to live without liquifying their environmental value. Therefore it is interesting to see what funding options are available and if is there a way to get money to fund a ECO-currency system.

Exploration

The Tobin Tax

Back in 1978, James Tobin proposed a small tax - these days the suggestion is 1/10 percent - on all foreign exchange (forex) dealings, the Tobin Tax. After that many discussions about Tobin Tax arose, but up until now nothing like it has been introduced anywhere.

Originally the Tobin Tax was designed to reduce disruptive speculation in de forex market by raising the cost of such speculations. This idea, of raising taxes over speculation builds on an even earlier proposal dating back to 1936, when Kaynes proposed the imposition of a small transaction tax on all stock exchange dealings to diminish instability in domestic stock markets[10]. This proposal was a reaction on the stock market crash of 1929, combined with the observation that speculation tended to be more prevalent on Wall Street than on Throgmorton Street (home of the London stock exchange) in part due to the absence of a tax in de New York market.

Apart from this effect, which it originally was designed for, a Tobin Tax would raise a lot of money which could be used to fund a system like the ECO currency.

In the conference proceedings published by on a conference about the Tobin Tax in 2003[11], both those in favor and those against a transaction tax present their papers expressing various difficulties and opportunities. Below a short summary of pro's and con's of the Tobin Tax is presented and the consequences using Tobin Tax to fund eco currency would have.

Thomas I. Palley (Open Society Institute) is positive about the Tobin Tax.[7] Main arguments why this should be introduced are that the Tobin Tax will reduce currency volatility and damaging speculation, it can enhance the power of domestic monetary policy, it will raise a lot of tax, it will reduce the dominance of financial interests over economic policy. In this article, Palley makes an analogy with casinos. Gambling costs resources which are justified because casinos are a form of entertainment. Much activity in forex markets are a from of noise trader gambling which have no entertainment value but do cost real resources.

Apart from these arguments on why the Tobin Tax is essentially a good thing to introduce, Palley discusses the feasibility of such a Tobin Tax. First he opposes to the argument of 'jurisdiction shopping' in which opponents of the Tobin Tax state that it will only work if introduced globally which is hardly feasible. Palley gives a number of arguments why this wouldn't necessary happen. He states that if the Tobin Tax would be introduced in e.g. the G-7, the 'Bank of International Settlement's' example shows that introducing guidelines which would make banking more expensive

"It is usually agreed that casinos should, in the public interest be inaccessible and expensive. And perhaps the same is true for stock exchanges."

- M. J. Kaynes

does not mean that banks would shift to jurisdictions where these rules do not apply. Instead, applying to the 'Bank of International Settlement's' standards has become the equivalent of a seal of good housekeeping. Focussing on the top 9 markets (UK, US, Japan, Singapore, Hong Kong, Switzerland, Germany, France and Australia) would already cover 84% of the forex dealings (Felix, 1996). Polley states that arguments and evidence suggest that introducing a Tobin Tax is feasible and that 'political will' is the ultimate constraint. Bottom line; the amount of revenue that the tax raises and the behaviors it discourages outweigh the possible difficulties it will bring along.

Randall Dodd states quite the opposite[12]. Dodd gives a few examples (security transaction tax in Sweden (1993) where 60% of trading volume moved, exchange-traded derivatives market which moved from London to Germany when tax implications changed during late 1990's) which show that change of legislation does bring forth jurisdictional shopping. As another reason why the Tobin Tax is bad policy Dodd argues that it will be a extraordinarily costly to implement. Forex transactions occur in the largely (if not entirely) unregulated over-the-counter market where surveillance and enforcement is most difficult. Another interesting argument against the height of

the revenues Tobin Tax would create is that the Tobin Tax is designed to reduce the very market it is getting its revenues from.

In these publications, many more arguments before an against are discussed. Jo Marie Griesgraber, detects two types of language, the activists' and campaigners' which are quite different from the technical language of economists[13]. Both sides though, agree on the need to expand regulation of 'over the counter' derivatives markets and financial markets in general. Also it is clear that many policy makers do not understand the language used to identify problems associated with the financial consequences.

New developments

Recently Brown and Sarkozy proposed to seriously look into the Tobin Tax as an 'innovative financing mechanism' for the UN. Brown and Sarkozy said predictable and additional finance should be ensured and thus no longer depending on 'short-term cash'.[14]

Another interesting development showing the idea of a transaction tax is getting more and more support is the recent promotion of a 'robin hood' tax[15]. February 10th, over fifty charity organizations (among which Christian Aid, Comic Relief and UNICEF) proposed a global tax to raise money, basically to do good. This tax will affect mostly banks but also various types of financial dealings (such as stock and bonds dealings). Getting money from 'the rich' to support 'the poor' gives this tax it's appealing name 'The Robin Hood Tax'. This tax will be broader than the Tobin Tax but is very similar to it. On their website you can support the robin hood tax. The tax is promoted on various social network websites, famous actors support the promotion and some 350 economist support the tax and wrote a letter to the G20. The motto; turning a crisis for the banks into an opportunity for the world.

It's difficult to say how much a Tobin Tax would raise, also because the effect of the Tobin Tax is that it will stabilize the market and thus decrease benefits. Looking at the the Bank for International Settlements figures of April 2007 though, daily turnover was reported to be over US$3.2 trillion. This would mean an annual raise of US$58.4 trillion.

Other funding methods

Apart from Tobin Tax, other funding methods could be thought of like 'philanthropy' or direct credit systems as with the current carbon trade systems. Also, the Tobin Tax is just one example of a tax which is raised through legislation, of course there are many more examples of taxes to fund environmental projects as seen with the projects shown by the Ecosystem Marketplace.

Philanthropy

Marketplaces of the 21st century are increasingly conscious, the information society provides more transparency. With this, the demand for more ethical business processes and actions has raised. This has led to major investments by large companies and the rise of many foundations (Shell foundation, McDonald's). These 'good deeds' known as corporate philanthropy, are a very interesting alternative to fund a model to balance environment and economy. The Shell foundation's total funds' in 2008 were US$300 million being the largest corporate 'philanthropic' foundation.[16]

Internalize external effects

The carbon trade system is an example of internalizing external effects, this way no external funding is needed. Companies responsible for, in this case, carbon emission buy credits to do so, projects that reduce carbon emission can sell credits and in this way get the money to fund the projects they are doing.

Conclusion

Several reasonable mechanisms have been proposed. Although there is still debate going on between economics themselves about the realization of such mechanisms. Forces of power seem to seriously take on the idea of a global tax. The current day public view stimulates larger companies to invest in ever growing philanthropy funds.

10 Kaynes, M.J., 1936, The General Theory of Employment, Interest and Money. MIT press

11 Weaver, James H., Randall Dodd, and Jamie Baker. "Scenario-Based Design." Debating the Tobin Tax: New Rules for Global Finance. Washington, D.C.: New Rules for Global Finance Coalition, 2003. Print.

12 Dodd, Randall. (2002) "Lessons for Tobin Tax Advocates: The Politics of Policy and the Economics of Market Micro-structure." Washington, D.C., FPF Special Policy Report 7

13 Griesgraber, J.M., New Rules for Global Finance Oxfam America in Weaver, James H., Randall Dodd, and Jamie Baker. "Scenario-Based Design." Debating the Tobin Tax: New Rules for Global Finance. Washington, D.C.: New Rules for Global Finance Coalition, 2003. Print.

14 Traynor, Ian. "Tobin Tax Could Fund Climate Aid under Proposals from UK and France." The Guardian. 11 Dec. 2009. Web. http://www.guardian.co.uk/environment/2009/dec/11/eu-double-climate-aid-2bn

15 The Robin Hood Tax, http://robinhoodtax.org.uk/

16 Shell Foundation, Trustees' report and consolidated financial statements for the year ended 31 December 2008

Are we ready to make environmental value explicit?

Moral

This issue is about whether we are morally ready to put a price on different elements in our environment. This is not as trivial as one might think; it is not as simple as putting a price on a tree and be done with it. Methods have been developed to do this though, but even then the underlying question remains.

Exploration

Contingent Valuation Method

The contingent value method is a one way to assess the value of the environment. The application of the contingent value method is critically assessed for cost benefit analysis by the Dutch CPB. They question whether environmental value and landscape values can be expressed in Euros. Although the method is widely used in assessing e.g. infrastructure projects, criticism remains.[17]

The method is used to determine the economic value of non-market resources. This could be biodiversity, but also education. It is important to note that both opposers and advocates of this technique include respected, nobel prize winning economists. It is therefore unrealistic to label this method wrong or right, but it is relevant to look at some of its implications.[18]

Inherently, uniqueness of products is never fully valued when expressed in money, whether they are produced goods(e.g. coffee machines or cars) or natural(e.g. plants or animal species). However, replaceable, often fabricated goods are more likely to be abstracted in such a way (full awareness of ecologic interconnectedness and therefore value is impossible since we can't grasp its complete complexity yet). This technique will therefore always remain dubious.

Unimaginable

There are also other voices. E.O. Wilson states that attempts to asses the value of the environment are never fully watertight[19].

With the majority of the world's species not yet discovered, E.O. Wilson states we are flying blind into the environmental future. It's clear to anyone we need the environment to survive, but from an economical perspective we only need the resources, not untouched nature. Wilson makes clear that this is a big mistake and the way we are going now means the extermination of millions of species not even yet discovered, species that might be the very species enabling humans to live on planet earth.

As an example, Wilson talks about 'Prochlorococci', a maritime bacteria that is responsible for the largest part of the photosynthesis in the sea (which is providing 60% of the earths oxygen).[20] This bacteria was only discovered in 1988. We only know about 6.000 species of bacterias yet, while we estimate that in a ton of soil there are about 4 million species. Wilson states we are destroying nature with a complexity and diversity of life in ways we have not began even to imagine. [21]

Nowadays

In the world today, however, things are quite different. Although it is never fully accurate, and morally debatable, a pricetag is put on our environment everyday. Whenever there is a disaster - whether natural or man-caused - a price is calculated. The moral considerations seem totally absent. It is remarkable that, even though the knowledge and understanding exist, there is few of this found in our day to day society.

Conclusion

Although the introduction of a eco-currency scenario seems vital to have some kind of measurement, it is difficult to properly put a price on environmental value.

A way around this moral dilemma is to pay people for their work and labor. Example of this can be found in National Parks all around the world. Without explicitly mentioning or determining the value of specific environmental assets, it still is protected and valued by paying the people who care for such a system. It makes more sense to pay the people who work instead of assigning money to people who own. A shift can be made, away from the concept of possession, and adapting a system of stewardship.

"Almost all the species that ever lived are extinct, and yet more are alive today than at any time in the past."

- E.O Wilson

17 Portney, P.R. (1994) The Contingent Valuation Debate: Why Economists Should Care, Vol. 8, No. 4, pp. 3-17, American Economic Association

18 Milgrom, P. (1993), Is sympathy an economic value?: Philosophy, Economics, and the contingent valuation method, in Contributions to Economic Analysis, pp. 417 -441

19 Wilson, Edward O., 2007. E.O. Wilson on saving life on Earth. Presentation at TED2007

20 Partensky P, Hess WR & Vaulot D (1999) Prochlorococcus, a mar- ine photosynthetic prokaryote of global significance. Microbiol. Mol. Biol. Rev. 63: 106–127.

21 Wilson, Edward O. The Diversity of Life. Cambridge, Mass.: Belknap of Harvard UP, 1992. Print.

What is counted as environmental value?

Taxation

If the environment is to be introduced into our economical system, it is important to determine what is counted as an environmental asset and how the value of different environmental assets relate to each other.

Exploration

What is value

First of all it is important to make a clear distinction between assets and value. In economics, assets are able to be owned, either physically or not. They do have a specific value, but that can change over time and depends on the need for those assets. The maximum amount of one asset a person is willing to give up to get more of something else is considered a fair measure of the relative value of the two things to that person.[22] Money is an accepted measure of economic value because it can buy anything and therefore represents the amount of all other assets one is willing to give up for this specific one.

In order to measure an asset's value and express it in money, the asset does not have to be for sale. It just needs to be estimated how much purchasing power people are willing to give up to get it, if they were forced to make a choice.

Environmental value taxation

That is exactly how the contingent valuation method works. It involves asking people how much they would be willing to pay for an environmental asset (or service) to determine its value. This value can then be taken into any existing economical models and calculations. Although this method has been quite successful, much debate has surrounded it since much of the outcomes are likely to be influenced by the questions and the way in which they are presented.[22]

Although the method might say more about what people say they would value instead of what they actually do, economic externalities (impacts left out of a transaction) can be internalized. One example is how the polluting effects of carbon dioxide have been internalized by the introduction of carbon credits. A price is set for a ton of CO2 emissions so the costs of pollution can be taken into cost benefit calculations.

This seems quite simple, and it might be for carbon emissions since they can be measured and monitored quite precisely (in weight). In case of internalizing environmental assets or ecological ecosystems more generally however, this is not the case. Is it possible to measure something as complex as e.g. biodiversity?

Several indexes have actually been proposed that could do just that. Like the Shannon index[23] which follows a mathematical formula including factors like the number of individuals, the number of species and the relative abundance of each species. Although an attempt, it might be clear that such methods do not encapsulate the complete richness of our environment.

As biologist E.O. Wilson stresses[19] (and a project like 'what's living in a cubic foot' illustrates[24]), humanity still hasn't got a clue as to how the ecological ecosystems around it work. It is somewhat arrogant to believe that it is actually possible to define a hierarchy between ecosystems, species etc. especially since there is no complete picture of what there is and how it all relates yet. Appointing inappropriate value to an asset could be disastrous for its survival.

Avoiding explicitness

It might also be possible to create a set-up in which environmental assets are valued without the need for a comparison with other species or habitats. In the US, the endangered species act[25] states that if destruction of an endangered species habitat cannot be avoided at all (constructing a mall for example), the same habitat should be stimulated elsewhere in equal or greater amounts. Although 'equal or greater amounts' are debatable conditions, it affects one species in specific and it does not require a comparison between different ones.

A term widely used in ecological economics is 'ecosystem services'[2], the term itself is illustrative for a different view on the role of the environment. Resources currently taken from the environment should not just be taken but seen as services provided and therefore they should be paid for. This means that the 'polluter pays' rather than the 'protector receives'. To make both principles work, it might also be worth valuing our services towards the environment.

"Valuing forests only for their carbon is like valuing a computer solely for its silicon."

-John Holdren

Conclusion

It is possible to put a price on environmental assets and insert in economical models an calculations, from an economics perspective. Methods used to define this environmental value need a specific measure. In some cases this might be possible yet difficult and time consuming. Looking at environmental value in general however, it gets even more difficult to make a sensible guess of the value of separate assets since relations between them are unknown. Other valuation methods might be less sensitive to the ungraspability of humanity concerning the richness and complexity of our environment. Options might involve valuing services used from the environment or the other way around (services people offer the environment).

22 "Dollar-Based Methods." Ecosystem Valuation. Web. <http://www.ecosystemvaluation.org/dollar_based.htm>.

23 Shannon, C.E. (1948) A mathematical theory of communication. Bell System Technical Journal, 27, 379–423.

24 Wilson, Edward O. "Within One Cubic Foot." National Geographic Magazine - NGM.com. Feb. 2010. Web. <http://ngm.nationalgeographic.com/2010/02/cubic-foot/wilson-text>.

25 The Endangered Species Act of 1973 (7 U.S.C. § 136, 16 U.S.C. § 1531 et seq., ESA)

How to administrate?

Administration

How will such a mechanism be administrated and by whom. Complexities in a system that balances environmental value and a growing economy needs to be overseen to keep the system running.

Exploration

Institutions

Many projects connected to environmental value in the current society (like protecting national parks, etc) are run by institutions. Foundations are founded to maintain national parks and experts advice large governmental institutions like the UN about what to maintain. As seen in many examples[4] institutions often loose track of the original goal they were founded to reach. Institutions often become non transparent bureaucratic organs which can result in a bad reputation and room for corruption. The control of an institution is in the hands of 'experts', appointed to manage the institution. It is key to have a monitoring system making sure the institution is doing what it is meant for.

When the administration of new system would be done by an institution, these things should be taken into account. Examples of how many projects are delayed or strugling can also be found in the eco-system marketplace.[2] However, as mentioned in the context of other chapters, collaboration is a very interesting phenomena which has proven to reach similar goals that institutions are founded for. Especially online, there is prove that collaboration can create very tangible results[26]. Often the results are much better than institutions do.

Collaboration is a very strong alternative to administrate the new system as opposed to institutions. Especially online collaborative communities are a very powerful tool to reach a goal. As Yochai Benkler explains in his TED talk[26], in an information-technology focused society, computers are the building blocks. Especially in western countries, but increasingly in non-western countries, computers are available to a large audience. This means that this large audience can make huge contributions to a society and its economy.

Online Collaboration

Due to its transparent nature and because anyone can join, an online platform that allows for collaboration is also more generally accepted and trusted. Some examples of how modern online tools help to contribute to environmental related topics are already emerging.

One example can by found in Brazil with Almir Narayamoga Surui. He is the Chief of a tribe in the Brazilian rainforest. He is nothing like the stereotypical image one might have. He uses new networks and technology, such as an iPhone, Skype and FaceBook to help preserve the forest. He even has connections with Google and Al Gore to help spread his cause.[27]

Another interesting example is the project NOAH. NOAH stands for Networked Organisms And Habitat and is a tool for people interested in their local wildlife. The infrastructure contains an Iphone application with which you can photograph any species that you come across. This date is stored and for everybody to access, this creates a map of 'the world's' biodiversity. This project demonstrates some interesting possibilities of iPhone apps as a platform to stimulate a decentralized administration of biodiversity.[28]

Conclusion

While traditionally institutions were set up to accomplish a task, alternative solutions exist today. In some cases institutions might still be the easiest way to go, though remains debatable. Collaboration seems to be a very potent alternative. With the right argumentation, either option might work. Combinations of both approaches can be imagined in several ways.

26 Benkler, Y. (2005), Yochai Benkler on the new open-source economics. Presentation at TED2005

27 Lean, Geoffrey. “Amazon Tribe Enlists Google in Battle with Illegal Loggers.” The Independent. 13 Apr. 2008. Web. <http://www.independent.co.uk/environment/green-living/amazon-tribe-enlists-google-in-battle-with-illegal-loggers-808492.html>.

28 U. Döbrich, and P. Noury, “ESPRIT Project NOAH - Introduction”, in D. Dietrich, P. Neu- mann, H. Schweinzer, Fieldbus Technology, Springer Wien New York, pp. 414-422.

How do we limit corruption?

Corruption

Wherever money is involved, economic incentives will invite the odd individual to corrupt. Examples of existing trading mechanisms show the potential threat of corruption. Strong regulations and (police)enforcement are required to tackle the issue. However, some of the countries with most biodiversity struggle with just that.

Exploration

Social control

In reforesting parts of Borneo Willie Smits uses local communities and their social control to prevent from extensive or premature logging[5]. To keep the control personal, several clusters have been developed. People within one village, for instance, determine what happens when one person in that village corrupts, while several villages within the area control each other on a larger scale. Such a social structure around his program strengthens its vigor.

The internet has opened a new way for corruptors to make money. Hackers have already tapped into the carbon credit market[29] and the Brazilian logging[30] permit system to make millions. However, some collaborative projects on the web also indicate the power of the online community. With systems like couch surfing and ebay, users build up credibility (and in a way power), the more positive feedback they receive on their services.

Conclusion

The threat of corruption will remain as long as money can be made. It can either be minimized by law and reenforcement or, in a more positive way, by adding credibility to those who do good in stead.

29 Zetter, Kim. "Hackers Steal Millions in Carbon Credits." Wired News. 3 Feb. 2010. Web. http://www.wired.com/threatlevel/2010/02/hackers-steal-carbon-credits

30 Kravets, David. "Hackers Plundering Brazilian Rain Forest." Wired News. 12 Dec. 2008. Web. http://www.wired.com/threatlevel/2008/12/hackers-plunder/

How does the eco fluctuate and relate to other currencies?

Exchange Rate

This question is a very specific one, and is very dependent on how the other questions are answered. But, looking at different examples from a historical perspective, insight can be gained.

Exploration

Not a Natural system[31]

A big misconception many people have is that the market (economy) is treated as if it were a natural system. That is not the case at all. It has been made an engineered by specific people with a specific goal in mind.

In the Late Middle Ages there was a rise of a merchant class. This class was creating and exchanging value in a way very much comparable with a peer-to-peer economy. There was no dependency on central employers or a central currency. Two important changes introduced by the Feudal lords and the aristocracy were to prevent this rise.

First a central currency was introduced, creating an artificial scarcity. Local currencies were made illegal. This central currency was easier to tax, and central banks could easily extract value by removing gold content.

The second 'innovation' was the idea of chartered economies. Kings could now grant exclusive rights, or monopolies, to certain companies in return for profit. For example, in

"From an economic perspective, cathedrals made sense as an investment in the future. There was fierce competition among cities to attract pilgrims from all over the Christian world, and cities competed for cathedrals, just as today they compete for Walt Disney Co. investments. The main difference, of course, is that cathedrals were also symbols of faith, masterpieces for thousands of craftsmen who chose to remain anonymous, and designed as lasting beauty. Is it a coincidence that cathedrals flourished as the most grandiose symbols of community solidarity in Western history, yet declined as soon as the brakteaten system was replaced with the king's monopoly on the creation of currency?

Interest on money constitutes one of the most systematic causes of our destruction of the global environment. Consider as metaphor, for example, the life of a tree (or any other living resource): Because of interest, the net present value of any income far away in the future is negligible. So, it literally pays to cut down a tree and put the proceeds in a savings account instead of letting it grow for another decade or century. Similarly, the only types of tree worth planting commercially are the fastest-growing varieties such as pine. (Nobody plants redwoods for commercial reasons.) So even when we plant trees, we are systematically losing biodiversity."

-B.A. Lietaer[34]

the American Colonies the British East India Trading Company was the only company that was allowed to trade. Colonists who grew cotton were not allowed to sell it to other companies, or make clothes. Instead, the cotton was shipped to England, where another company made the clothes. These clothes were shipped back to America to be sold to the colonists. This is clearly not an efficient system, but it is good for the few who are in the chartered monopoly.

But what happened in essence is that there was a shift in an economy that used to be based on abundance and collaboration. This became scarcity and competition. These ideas are still with us, and are so normal that we mistake them for laws of economic activities. Voices rise that big change is needed.

The Gold Standard[32]

Gold has been an internationally accepted currency, because it is neutral. It cannot be manufactured by a single country. This explains the role it has had over the years as a valuable medium of exchange.

When money was still coupled to gold, inflation was almost unheard of. In England there was practically no inflation between 1664 and 1914. Since the dollar is no longer backed by gold it lost about 90% of it's value. When gold was still the backbone of our monetary system, there was a big market stability.

However, governments didn't like the discipline it took to keep up with the standard. They wanted to spend more money. A reason to do this, is to keep the nominal worth of the coins the same, slowly degrading the real, intrinsic value. Romans already did this: making coins that were worth 10 denarius, while only putting 8 denarius worth of resources(gold or silver) in them.

An increase in the price of gold puts pressure on the dollar. That's why americans used to do everything in their power to keep the price of gold low. They prohibited Japan to increase their gold deposits after World War II. Even today, countries can only join the IMF when they disconnect their currency from gold. Even the Swiss yielded in the nineties, to join the IMF.

Effectively, by allowing banks to lend more money than they could back with their vaults, governments could borrow more money to accomplish their goals. The only way this could work was without a connection with gold. After a century of debate, the gold standard was definitely let go of in 1971. Since then, our monetary system is not longer based on possession and capital, but on debt and credit.

Supply and demand

There are three laws, or cornerstones of the economic theory, and together they form the basic principle of supply and demand.[33]

LAW I. When, at the price ruling, demand exceeds supply, the price tends to rise. Conversely when supply exceeds demand the price tends to fall.

LAW II. A rise in price tends, sooner or later, to decrease demand and to increase supply. Conversely a fall in price tends, sooner or later, to increase demand and to decrease supply.

LAW III. Price tends to the level at which demand is equal to supply.

What is interesting about this, is it's implication about scarcity. Following these rules, something that becomes scares also becomes more valuable. When the environment, however it is defined, becomes scares it becomes more profitable to invest in it. This will lead to a balance.

Conclusion

It is very difficult to make explicit statements about our economy. Statistics and facts often remain impressions and opinions. However, realizing our economy is not a natural phenomenon, but rather a man-made system with rules, gives us the freedom and possibility to explore, ask questions and alter it the way we see fit. The supply and demand mechanism is very valuable. It means we don't have to arbitrarily set a price on the currency or the assets associated with it. Letting the mechanism run seems like a good way to to ensure the optimum exchange rate.

31 Rushkoff, Douglas. "Edge: Economics Is Not Natural Science By Douglas Rushkoff." Edge. Web. <http://www.edge.org/3rd_culture/rushkoff09/rushkoff09_index.html>.

32 Middelkoop, Willem, and Sander Boon. Als De Dollar Valt: Wat Bankiers En Politici U Niet Vertellen over Geld En De Kredietcrisis. [Amsterdam]: Nieuw Amsterdam, 2007. Print.

33 Henderson, Hubert D. 1922, Supply and Demand, At the University Press, Cambridge University, Nisbet & Co. LTD. London.

34 Lietaer, Bernard A. The Future of Money Creating New Wealth, Work and a Wiser World. London: Random House Business, 2002. Print.

What can we learn from existing CO2 or ecosystem trading systems?

Comparables

Researching the possibilities for a new link between the economy and the environment, a lot can be learnt looking at previous cases in which environmental goods were taken into the economy to keep it from being overrun. As the biggest, and regarded by many as most successful ecosystem trading mechanism, the carbon credit trading scheme is an interesting comparable in terms of scale and execution. Many other relevant systems have been introduced, in several forms. Studying these cases it is important to note the differences and similarities with this current study.

Carbon credits

See the quick guide to carbon credit trading on page...

To reduce greenhouse gas pollution and put a price on their emissions, a market driven approach was formulated in Kyoto, 1997. Although still surrounded by much debate, it is by far the biggest existing market for environmental assets.

The basic principles of the Carbon Credit system seem to be beautiful, however envisioned results seem to hold off. Godfather of the green movement James Lovelock (among others) even states that the operation of this system turned out to be disastrous[3]. In the initial phase of the program companies have put their government under pressure to give out more credits than actually needed, threatening with massive job losses or even moving to another country[35]. This allowed companies to actually benefit financially from the credits they got. Today prices are way too low because of this carbon credit abundance and companies can easily pay off their pollutions.

The complexity of the many boards, panels and monitoring organizations has also led to a more fundamental pessimism. International politics have made the realization of these markets painstakingly slow and many ask whether it is even possible for our institutions to organize and administrate such big and complex environment based markets?

Deforestation prevention

In order to develop poorer areas, the Brazilian government has been stimulating agriculture in some remote and forested areas until recently. Although the education and healthcare facilities have improved the lives of the local people, it has also come with great natural depletion. Deforestation accounts for 70% of Brazils carbon emissions today.

The richness of the soil in these areas make for attractive farming of soy and palm oil for which there is a high demand in American, European and Chinese industries. Because people cut down their trees for economic reasons, it is necessary to provide them with a financial alternative.

Several payment strategies have been proposed or put into practice on a small scale. These include direct payments to those farmers leaving the trees (which turns out to be very expensive in order to seriously compete with crop profits) and indirect subsidies like a higher price for crops produced without forest destruction. Because of the amount of money at stake, these programs often remain

vulnerable to corruption and could easily end up serving as cash cows for the very people destroying the forests today.

The UN's REDD[36] (Reducing Emissions from Deforestation and forest Degradation) will actually reward the countries that do preserve their forests by valuing the amount of carbon the standing forest sequesters within the global carbon market. Strict regulations surrounding the actual sequestering value of the forest apply and administration seems timely.

Other biodiversity markets

Next to carbon and deforestation regulations, several other biodiversity market mechanisms have been implemented[2]. These often apply on a smaller scale, within countries or even more locally. Whether they involve water, wetlands or endangered species, their aim is to internalize environmental values that are currently externalities to the economic system. Although they apply in many different countries and on many different values, many parallels are found.

In many cases the government that initiates the laws for these markets to emerge is actually the only 'buyer' of the so called ecosystem services. True markets however, rely on multiple buyers and sellers, and thus these systems do not end up with a proper price based on its value to the community.

The working of these systems also heavily relies on government oversight, strong enforcement of the regulations and a robust funding. The type of institutions this requires are often not functioning in some of the countries with the worlds most biodiversity[2]. That makes the marketplaces created vulnerable to corruptive forces.

Conclusions

The rules that allow for markets to internalize environmental assets are all based on government regulation. It is key to support these regulations with strong reenforcement. The more countries involved in the marketplace, the more political struggle is to be expected. Many of the reviewed examples used the principle of polluter pays, very few worked the other way around by actually rewarding those that protect and preserve. In all examples a key factor in the execution was the fact that the asset to be valued was somehow measurable and comparable to other assets. Although this might not be the case with the environmental ecology as a whole, these real world examples enrich the research on the several questions surrounding this project with some useful experiences.

A quick guide to carbon credit trading

In order to decrease greenhouse gas emissions and to increase the price of products which do require emissions, carbon credits were introduced following the Kyoto protocol (1997). Each unit of this credit represents the allowed emission of one ton of CO2. Other gasses are set to be worth a certain percentage of the carbon credit, according to the threat they pose to the environment.

Each country gets a certain (and set) amount of these caps. Nations are responsible for setting up their own system to register the emissions of their own, local businesses. The UNFCCC monitors these systems to guarantee their honesty.

Operators are free to sell their left over credits, or companies that exceed their limits can buy extra through an open market. Companies are given the choice to invest in a cleaner production process or spend their money to buy credits from others. If more companies want to buy credits, supply and and demand will increase their prices which will lead their (polluting) products to be more expensive than cleaner ones.

Three mechanisms for trading caps have been introduced:

Joint Implementation: One developed nation sets up a business in another developed country.

Clean development mechanism: A company from a developed country can sponsor a project or company in a developing country. Projects are usually cheaper, but the effects on global emissions are the same, regardless country borders. Investing companies would be given carbon credits, developing nations would benefit from the new technologies brought in.

Emissions trading: This allows countries to trade their credits on an international market with forces of supply and demand.

The open market also allows for organizations to purchase credits and retire them. The amount of credits will decrease and their price increases. Because emitting companies need to buy these credits the price of their polluting products will rise all the same. This mechanism will therefore stimulate the use of cleaner materials, production methods and transportation.

As a company you can also generate credits by offsetting or sequestering CO2, these credits can then be sold on the international market. An interesting condition for such a procedure is set: the company has to prove that it wouldn't have offset this much if it weren't for the credits. This mechanism is essential for the whole system to lead to a net decrease of greenhouse gas emissions.

Since the opening of the financial carbon market in 2005 it has been steadily growing and the market (based in London) is expected to ever become more important.

How will economical and moral incentives blend?

Incentives

This question should be asked when a scenario begins to get shape. From the point of view of any of the stakeholders influenced by this scenario it is important to realize that not all people have similar moral and incentives. What alternatives do people have in certain situations and what is the value of their choice.

Exploration

Willie Smits restores a forest

In his TED Talk Willy Smits explains how he restores a rainforest[5]. He provides the recipe for reforestation. Although his incentives are clearly moral, he has found successful ways to involve the local community and provide them with a positive incentive. The local community needs money for their daily needs, whereas before they would cut down the trees and earn money from wood, they are now given work within the reforestation process. A mix of the right plants provide for enough income. Also a social structure fitting the local community ensures the local's dedication. Smits states that the key to success is to get the local communities involved in solution that fits local culture.

Development vs Biodiversity

Mapping the world's biodiversity shows a striking picture where some of the worlds most biodiverse areas are also the poorest. This is both motivating but also dangerous. Introducing eco-currency can actually make local people benefit from preserving the valuable nature, not only biodiversity will benefit but it will also lead to social improvements for some of the world poorest. The way in which this 'currency' will be transferred should be carefully considered to make sure development will be spread throughout the community and prevent multinationals from becoming global landowners.

Reaching a goal through collaboration

Clay Shirky[8] provides a showcase of examples where contribution by labour can be without any economic incentive. Throughout the internet many examples of platforms are build by open source software and goals are reached that normally expensive economically focussed institutes would reach. Yochai Benkler[26] shows the example of apache (with no economical incentive) and its function in todays economy where 70% of the internet runs on it beats Microsoft (with economical incentives).

Pay for the forest

In brazil the government tries to prevent deforestation by paying farmers to leave the trees or by paying more for crops produced without deforestation[2]. In practice it shows that economical incentives are valued over moral incentives. Farmers can earn more by deforestation. This example shows that the

alternative trying to provoke a moral incentive should financially be able to compete with the economical incentives.

Carbon credit schemes

An example where moral incentives are blending with economic incentives can be found around the carbon credit scheme. Neglecting the actual reason for the carbon credit scheme (decrease of carbon emission), many companies are only aiming for the money that can be earned with the carbon credit schemes.

Value proposition

In a way the problem with moral and economical incentives can be explained as a value proposition. Seen from the point of view of a farmer, a new environmental friendly proposition should provide him with the same value as his current option of deforestation and agriculture. When this is not the case, a poor farmer has an economical incentive over a moral incentive. It is impossible to blame him for his actions, since everybody would opt for daily needs in life.

Conclusion

Like mentioned in the introduction, this question should be taken into account when developing a proposition to introduce an ECO-currency. The many examples apparent today show that often economical incentives are stronger than moral ones. It is impossible to blame the person opting for this incentive for valid alternatives are not present.

"Especially for people from industrialized developed countries it would be rather hypocritical to make a moral call upon the Brazilian farmer, who might simply respond: "Ok, so you have destroyed their own prehistoric woods a long time ago for your own economical benefit, and now you are telling me to not cut mine? No, thank you." Shouldn't we, rather than patronizing the farmer on his moral obligation towards the environment, search for ways to economically compensate the farmer to leave the rainforest untouched?"

-Koert van mensvoort

35 Webb, Tim, and Terry Macalister. "Carbon Trade Wrong, Says Lord Browne." The Guardian. 8 Mar. 2009. Web. http://www.guardian.co.uk/business/2009/mar/08/oilandgascompanies-carbon-emissions

36 Verchot, L. and Petkova, E. 2009 The state of REDD negotiations: consensus points, options for moving forward and research needs to support the process. Unpublished manuscript. CIFOR, Bogor, Indonesia.

How and where should the ECO currency be promoted?

Promotion

This is a subquestion that is very important once a solution is found. It very much depends on this solution, and can only be made concrete further on in the process. However, there are several clues and directions one can follow in making this part a success.

Exploration

What's in a name[37]

American participants in an experiment for psychological science -with self acclaimed, varied political preferences- were proposed a program that would increase prices of carbon emitting activities. The extra costs would be directly used to pay for renewable energies or carbon capture and sequestration. All participants received the exact same proposal except for the name of the surcharge, half the people read about a "carbon tax", the other half about "carbon offset". They were finally asked to choose between purchasing two identical products, one only being costlier because it had this surcharge.

If the surcharge was called an offset, democrats, republicans and independents were more likely to select the more expensive, but environmentally friendly product. All parties were open to making such a charge mandatory by law. In case it was named a tax, both republicans and independents opted for the cheaper choice, not supporting legislation of such a tax.

The study shows we have to carefully think about how we communicate some of the plans that will be proposed in this project. Even if the theory behind the system works, it needs to be promoted in aright way in order for it to gain wide acceptance.

Publication and virals[15]

Recently there has been a movement that promotes a so-called Robin Hood Tax. Essentially it is the same as a Tobin tax, with some changes in scope. The interesting point is that the initiators are using the bad reputation of the bank in combination with internet virals and celebrities to spread their cause. While their idea might not be so new, the way they bring it is understandable and iconic for everybody to see. The message is very clear, concise and positive. Extra, more deeper information is available on their website. Communication is key.

Transparency [38]

It is also very important to be transparent. Explaining the public where fundings go, where they come from and what cause it has helps promoting the issue. People are less willing to pay, or accept a certain measure, if they don't understand the logic and logistics behind.

Conclusion

The main conclusion is that the promotion of the eco-currency should be tailored specifically for its audience. In order to do this, the target audience, competitors, pro's cons and value proposition should be very clear. Only then a suitable promotion method can be found, and it's promotion/information campaign can be made. Transparency is important: letting the public know what it's about, and what costs are.

37 Hardisty, D., Johnson, E. J., & Weber, E. U. (in press). A Dirty Word or a Dirty World? Attribute Framing, Political Affiliation, and Query Theory Psychological Science.

38 "Transparency and Open Government." The White House. Web. http://www.whitehouse.gov/the_press_office/transparencyandopengovernment/

Exploration

Conclusions

The exploration of the several research questions opened up a wide scope of discussions related to a.o. economics, biology and social studies. The state of the discussions suggest that it is not possible to bluntly answer the research questions stated, but that their interpretation heavily depends on the context in which they apply. This exploration has clarified and structured the possible interpretations and their relevance to possible scenarios. Some distinctions will have defining effects on such concept propositions, others will depend on them.

Roles of the research questions

Next to building up a base of background knowledge on the areas surrounding the project, the exploration phase also reframes the questions themselves with respect to the overall research.

There are no single, clearcut answers to the several questions asked. They are often still subject of heated debate between the experts themselves. However, the effects of these discussions with regard to a concept of an eco-currency do clearly differ. It is possible to distinguish between defining answers and depending answers to the questions asked. Defining answers change the face of a concept in such a radical way that it completely changes all the rest, where as depending answers depend on the system proposed.

The first six questions as listed seem to be most influential in their answers. Research on the organization of a new marketplace for environmental value for example, hints it can be done by a central government or institute or through an online bottom-up approach. Both have their advantages and disadvantages to be taken into account, but regardless of such decisions it is clear that either one would result in a completely different scenario.

Answers to the last five questions of the list seem to be much more depending. Although they are important questions to be asked, they don't need to be answered first. The question about how to promote the system for instance. Although it could be extremely important to answer, this response heavily depends on the type of marketplace created. Promotion could merely function as an awareness creator, or stimulate actual participation of people but it makes little sense to start a concept from such a decision.

3. Scen

arios

With a substantial amount of references in various directions of the problem at hand, the next step was the design of scenarios where various answers on different topics are combined. During the exploration of the eleven topics, various examples and conclusions were drawn on the extent to which different solutions might have different results on the specific topics. These explorations were done in a very broad scope around the topic neglecting consequences for the other aspects of a eco-currency scenario. To go ahead into forming a roadmap and scenario for eco-currency the different questions were put into perspective. The consequences of different solutions and examples found during the explorations were discussed.

As mentioned in the conclusions of the exploration section, the eleven questions have different roles. Answering the defining questions in different ways was the starting point for the first iteration of scenarios. During next iterations the depending questions were answered to combine various defining answers into one scenario. This resulted in three scenarios which cover the important findings of the explorations. In these scenarios all questions were answered to form a complete picture.

Scenario based design

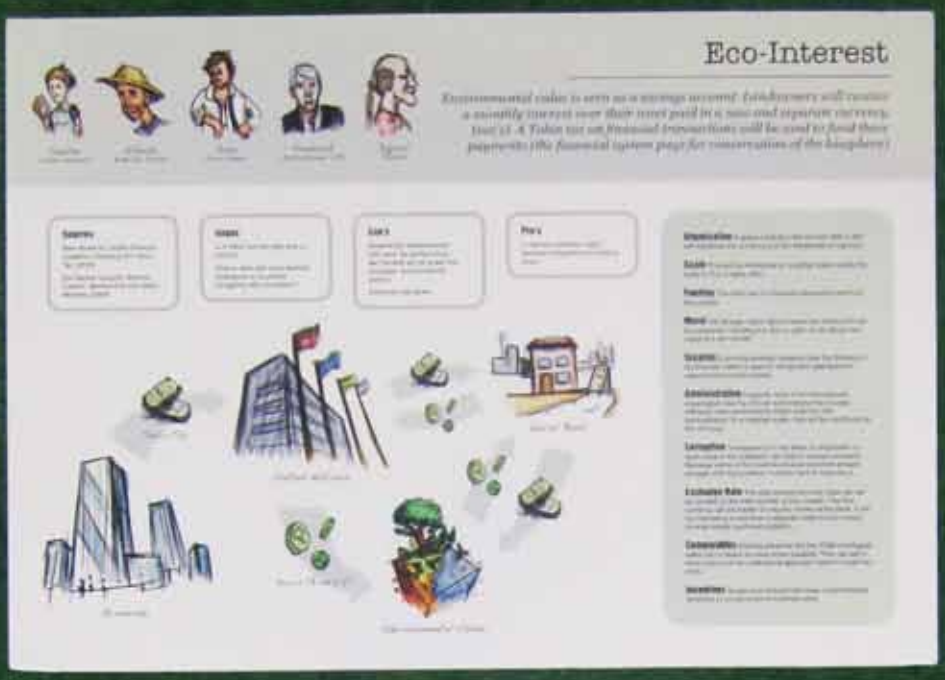
The scenarios were designed in a concise and visual matter, they should function as a tool to find deeper consequences and difficulties in an expert validation process. The scenarios were summarized to a short introduction, a flowchart of the various aspects and relations of the scenarios and answers to the eleven questions. Because different scenarios have different stakeholders involved, simple personas were added to the scenario boards to personalize the consequences of the scenario. To put the scenario in perspective, pro's, cons, issues and sources were added, these showed what aspects of the scenarios were interesting to focus on during evaluations.

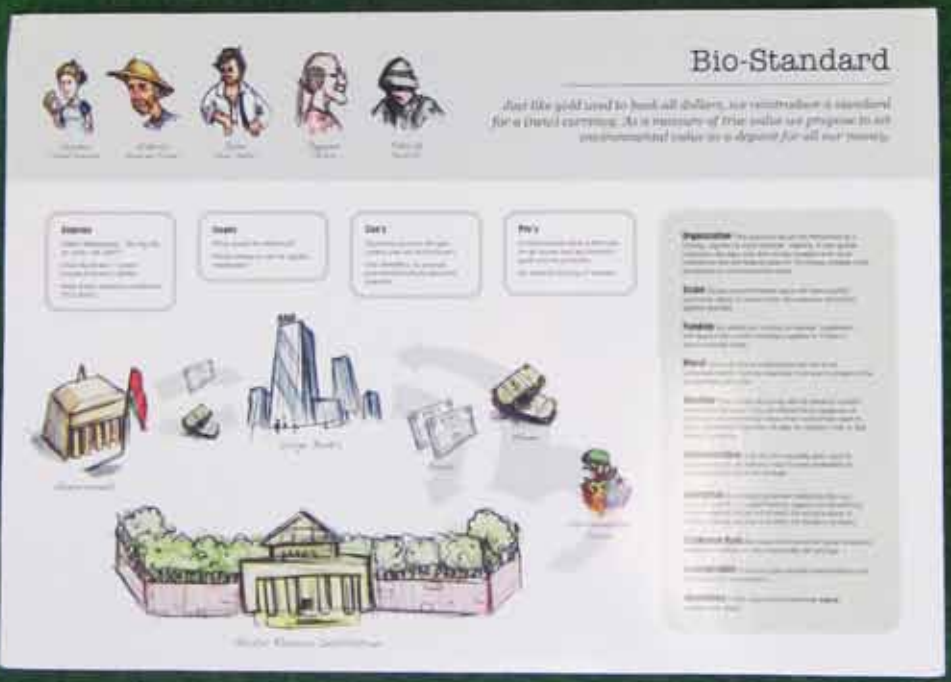
In this section the three scenarios used as an input for the expert validation are explained and the feedback derived from the evaluations is discussed. The feedback from the expert validation combined with the position of the design team, coach and client resulted in the setup of a low fidelity prototype around some aspects of the scenarios. This prototype was tested and evaluated during an exhibition.

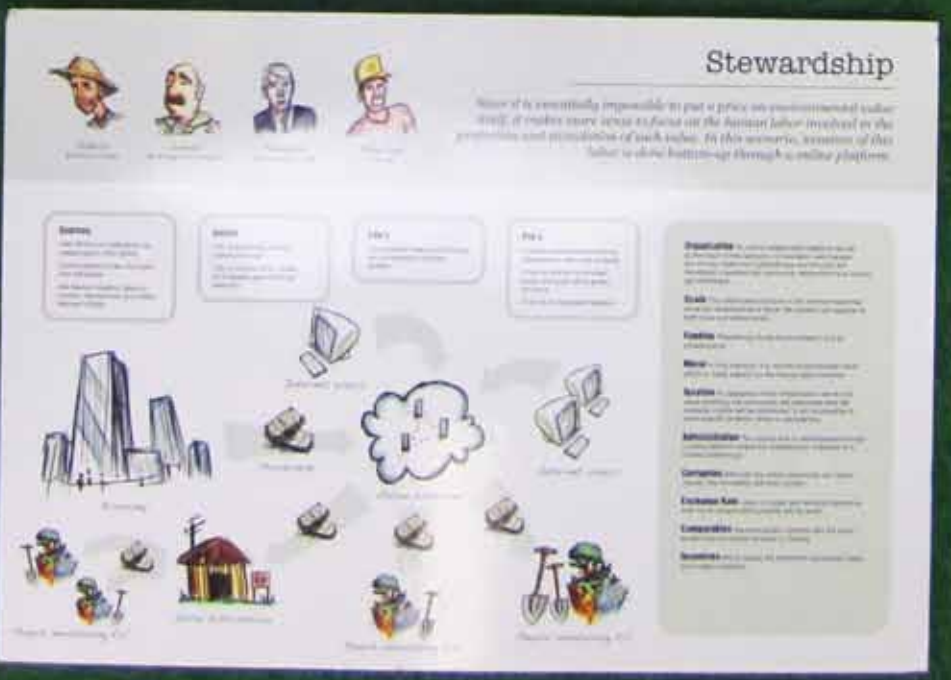
The input of the economic experts, the design team, coach and client and the results of the tests with the low fidelity prototype resulted in conclusions on the three scenarios. This conclusion combines aspects of the three scenarios as a basis for one proposition.

The boards created to discuss the scenarios.

blog.eco-currency.net/category/scenarios/


Eco-Interest
Environmental value is seen as a savings account. Landowners will receive a monthly interest over their asset paid in a new and separate currency, (say) $. A Token tax on financial transactions will be used to fund these payments (the financial system pays for conservation of the biosphere)


Bio-Standard
Just like gold used to back all dollars, we reintroduce a standard for a (new) currency. As a measure of true value we propose to set environmental value as a deposit for all our money.


Stewardship
None of it essentially impossible to put a price on environmental value itself, it makes more sense to focus on the human labor involved in the protection and reproduction of such value. In this scenario, valuation of this labor is done bottom-up through a online platform.

Scenario I

The bio standard

Just like gold used to back all dollars, we reintroduce a standard for a (new) currency. As a measure of true value we propose to set environmental value as a deposit for all our money.

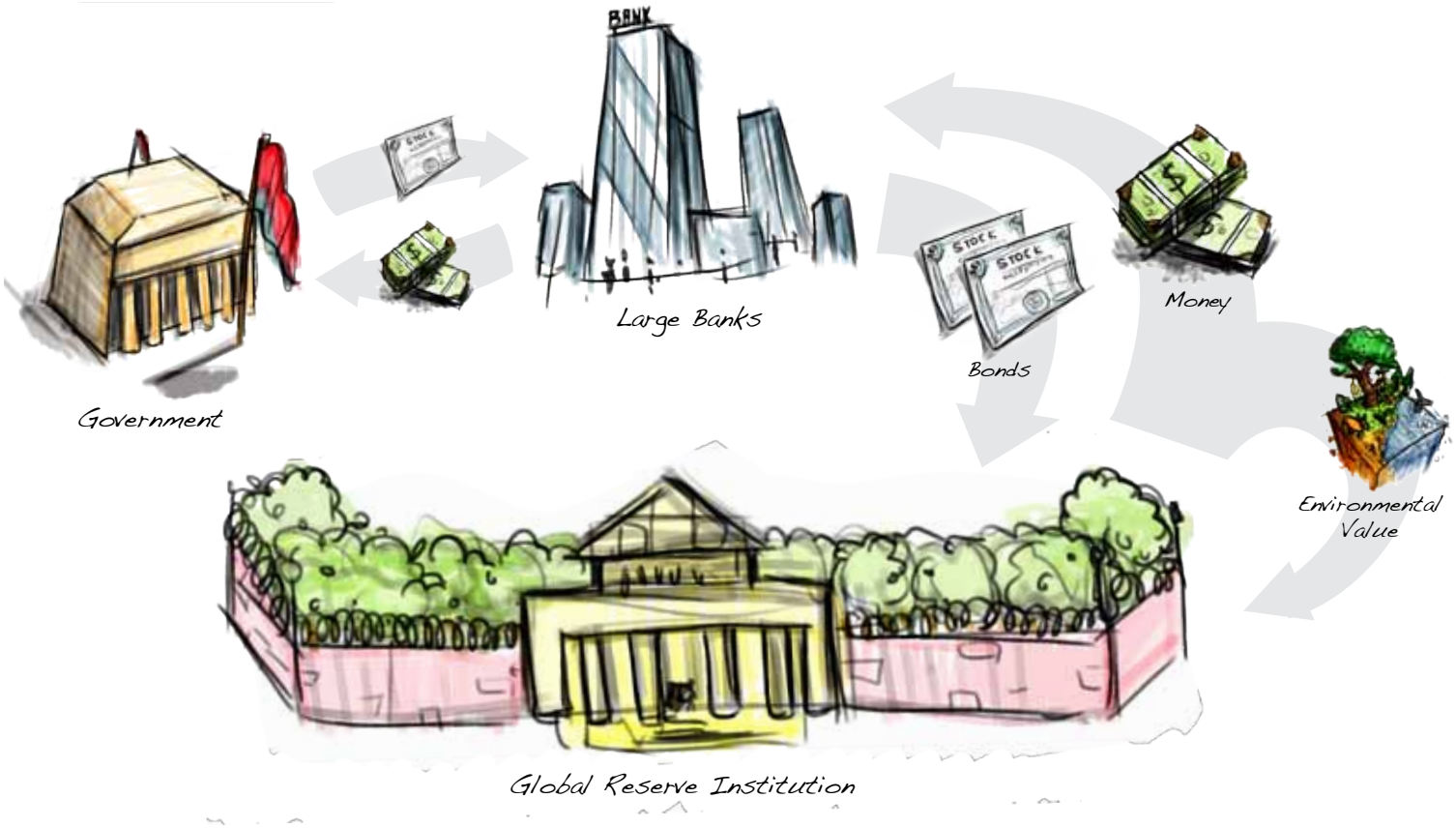
Introduction

From much of the research it became clear that environmental value is truly essential for life on earth. As some kind of thought experiment, this scenario takes this notion to the extreme. It is very unreal but in theory this scenario has some interesting aspects which aren't so weird. Currencies in cultures around the world have been backed by one material for more than 4000 years: gold. Gold didn't have a special use, it was purely valued for its scarcity. The fact that people knew their money was backed by a constant and valuable material like gold, provided the confidence in the currency.

This insight formed the starting point of the thought experiment as the basis for this scenario. The scenario starts from the question: what if all money is backed by environmental value? This means that whenever new money is created, more environmental value must be created as well. Because of its intrinsic value it would be protected like gold used to be. Similar to the way you could sell gold to the bank for money, you could now sell environmental value to the bank. The monetary value of this environmental value will depend on the market status and banks will be advised by biodiversity experts. If the economy remains the way it currently is, if it keeps growing, this means that more environmental value should be created or protected. Eventually the earth could be insufficient to fulfill the growing demand of the economy, we might need to either reform our economy or think of new ways to create environmental value.

Flowchart

This flowchart shows how simple this scenario in theory is. The monetary system as we know it today can remain the same, the only thing changing is the place where new money is created. Rather than creating new money based on thrust (that a nation is able to pay back the value of a bond someday) money is created and backed by something tangible: environmental value. The global reserve institution needs to extend its environmental value stock when it issues new money. This environmental value is preserved and always exchangeable for money.



Evaluation

The most interesting results of the eleven discussions with respect to this specific scenario are reviewed now they are explicitly contextualized.

Organization: The scenario should be introduced worldwide by a institute powerful enough to make such changes. An institute like the United Nations should establish a new global reserve, a global institute responsible for money creation.

Scale: The scenario should completely change the monetary system and would best be introduced on a global scale.

Moral: Morally this scenario is very debatable, which makes it interesting to consider. It feels very wrong to deal with the environment in such a way but it also shows the moral implications of an economy based on thrust needing to grow in order to sustain itself.

Comparables: In a naive fashion this thought experiment should be compared to the previous gold standard. What would the consequences be if we introduce a monetary system based on environmental value as it used to be based on gold.

Conclusion

In an extreme way this scenario makes the problems of a growth demanding economy evident when the environment and the economy are linked. It shows that on the one hand economy and environment should be linked, but at the same time, there are limitations to this link. The current monetary system is completely virtual with no limitations as to its size, the growth of the system though requires resources, resources that are not virtual and which have limitations. It makes the problems a ever growing economy will face very explicit.

Scenario II

Eco-Interest

Environment value is seen as a savings account. Landowners will receive a monthly interest over their asset paid in a new and separate currency (eco's). A Tobin tax on financial transactions will be used to fund these payments (the financial system pays for conservation of the biosphere)

Introduction

In this scenario environmental value is approached as a savings account. A piece of environmental value will be assessed based on known taxation methods like the Shannon's biodiversity index[23]. This is done by a global institute, managed by the united nations. Each month, an environmental asset owner will receive a percentage of the value of his environmental asset (interest) in ECO's, a new currency. ECO's can be exchanged for local currency with local banks.

These local banks or foreign exchange dealers can change the eco currency with the world bank which will accept it as a valid currency. Additional funds needed to pay for the eco-currency come from a global tax; the Tobin tax on financial transactions. The Tobin tax will fluctuate depending on the economy, the better the economy, the more financial transactions. Also the amount of ECO's issued will vary, more people might request eco's and values of environmental asset can change over time. These fluctuations will result in a fluctuation of the eco currency. The value of an eco is determined by a devision of the total income from the Tobin tax and the amount of ECO's issued. This means that with a better economy, investing in environmental asset is more interesting. This image fits the image of an economy and environment, linked together in balance.

The scenario uses a new currency, which adds an interesting aspect to the scenario where the currency could be accepted by more people as an actual currency. If people trust the eco, shops in areas where many people earn eco's might start to accept them. In this way the currency is not only a symbol of good behavior but also a actual tender. Foreign exchange dealers might start to trade ECO's. This creates an economical incentive where the connection with environment is not too apparent.

Flowchart

In a way there are two cycles in this flowchart. One of the ECO's; they are issued by the United Nations to owners of environmental value, these people can trade with a local bank which in turn trades them with the United Nations. This cycle might change when other instances accept the eco as a legal tender.

The other cycle is that of regular money. The money comes in through a tax over the global economy and will eventually reach the owners of environmental value which in turn spend it bringing it back into the economy.

Evaluations

The most interesting results of the eleven discussions with respect to this specific scenario are reviewed now they are explicitly contextualized.

Moral: Morally this scenario is very debatable, the way the taxation is arranged in this scenario might be very bluntly according to some sources. Environmental value is assessed whilst neglecting many aspect of the environment. It's tricky to choose a taxation method because some parts, and relations of environmental value will always be ignored.

Corruption: Transparency in the tasks of employees on each level of the institution can help to reduce corruption. Because some of the most bio-diverse countries already struggle with this problem, it will be hard to minimize it.

Exchange Rate: Because of the link between the economy and the value of environmental asset, the relation between the two might be a fitting one; a bigger economy means more money (higher economic incentive) to invest in environmental value.

Incentive: If the eco is fully accepted and people trust the value of the eco, moral and environmental incentives will both be fruitful for the environment. In this scenario the environment truly becomes a part of the economy as we know it. Economic trading markets can be formed around it where the actual estates are less important.

Promotion: In this scenario an actual new currency will be created. The eco can be a strong promotion tool. Owning ECO's means that you are in some way related or investing in environmental value. People might want to have these ECO's to show they are supporting the environment.

Conclusion

This scenario is in essence very simple; environmental value as a savings account with a global tax on the economy (the other side of the balance) paying the interest. The question whether it is morally acceptable to apply methods invented by men to assess the value of the environment is ignored. The link that exists, between the economy and the environment though is a very interesting one. The relation between the size of the economy and the value of environmental asset fits the need to invest in the environment with a growing economy. With the environment as a part of the economy both moral and economic incentives result in investment and sustainment of the environment.

Scenario III

Stewardship

Since it is essentially impossible to put a price on environmental value itself, it makes more sense to focus on the human labor involved in the protection and stimulation of such value. In this scenario, taxation of this labor is done bottom-up through an online platform.

Introduction

This scenario is based on two important answers to some of the eleven question the research is formed around. The way taxation of environment should be dealt with and the way to organize a new financial mechanism to link environment en economy.

Although environmental value is expressed in money every day (when damage to environment is done by companies or when new roads are built) these methods are not describing the 'true' value of the environment according to many biologist, (E.O. Wilson e.g. states that we don't even know what the role and thus value of the environment is). This scenario is based around the insight that it might make more sense to value stewardship rather than the owning of environmental value. What if the environmental value itself would be ignored and the labour that is put into sustaining environmental value would be valued and payed for. What this labour is or should be is kept vague; anything that sustains or creates environmental value can be profitable.

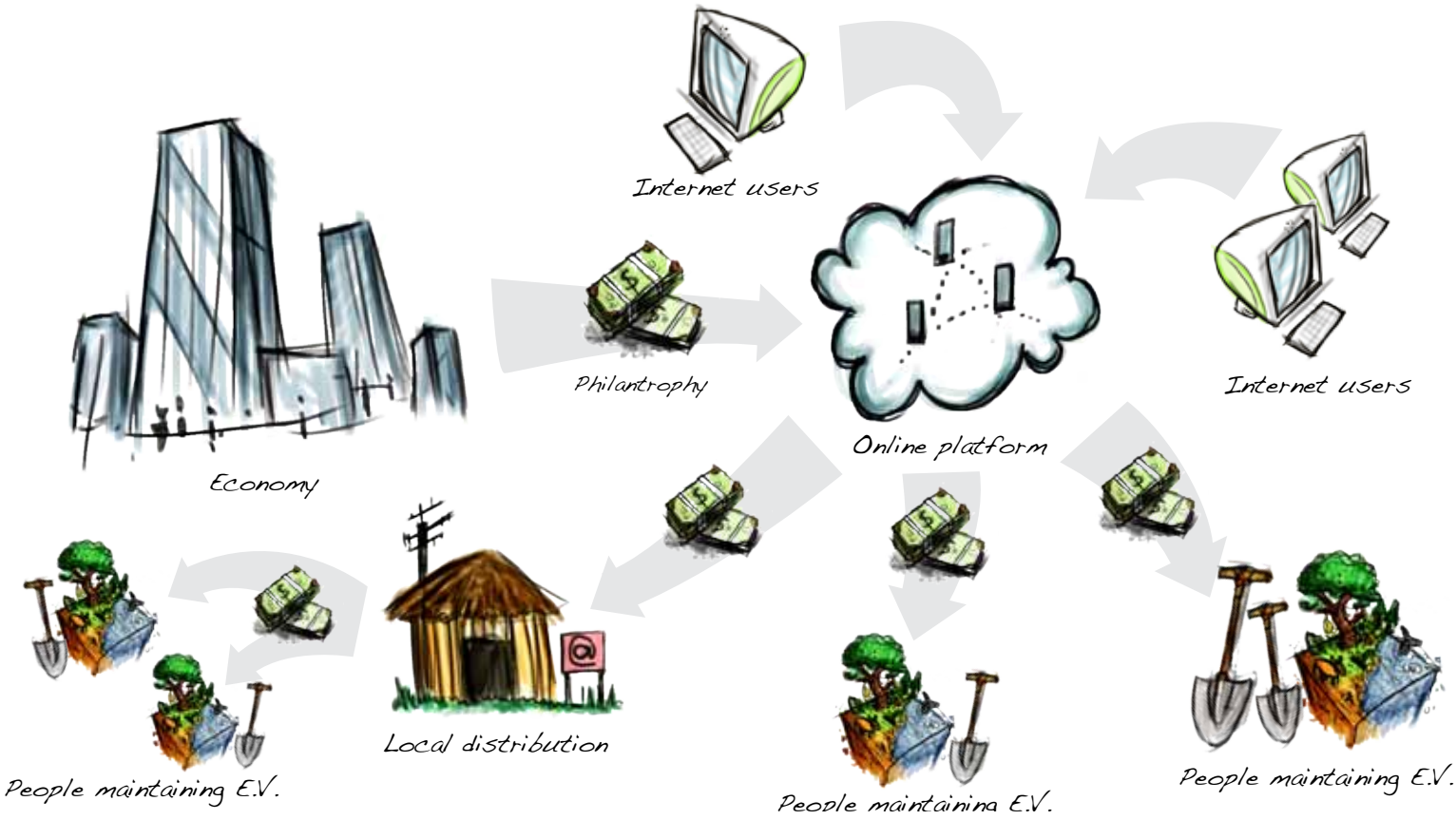
A big question still arises which is how to determine what labour is valued how much. In the explorative research conducted one big trend in the field of organizing new initiatives was found mainly in online examples; collaboration. As described in the exploration part, collaboration reaches goals more efficient than institutes do and because its transparent nature, support is often large. In this concept an online platform will determine how the money is divided over the different jobs.

The money in this scenario comes from philanthropy, the act of giving money voluntary. Large companies give a lot of money to charity. This platform could be such a fund. The way the money comes in in this scenario could also be different; like mentioned in the exploration phase through a global tax e.g. The way this scenario is set up though is to try to make it 'voluntary' to fit the bottom up approach. Rather than any form of force upon companies and the economy from above.

The money this raises is the money the online platform can divide over the jobs. People can vote online what job they thinks should earn money. The more votes a job gets, the more money the person who's doing the job will receive. The jobs proposed on the online platform can be categorized and organized in many ways so that people who want to vote can also vote for an area, a type of project, an approach, etc

Flowchart

This scenario is based around an online platform where money comes in and goes out. The money comes in from philanthropy. The online platform does only what the community decides. The distribution of the money is completely in the hands of the community. On the online platform anybody can propose a 'job' where they would like to get payed for. The better this is promoted, the more money it will raise. The platform leaves room for economical initiatives such as small enterprises who will take care of local distribution of money and job promotion. These enterprises could make it possible for people without computers and internet to participate in this scenario. The enterprise could profit by asking a percentage of the earnings.



Evaluations

The most interesting results of the eleven discussions with respect to this specific scenario are reviewed now they are explicitly contextualized.

Organization: A very interesting and new aspect in this scenario is the bottom up approach into organizing the financial mechanism. Not only could this result in an qualitative way of assessing the value of the environment, also, collaboration provides the transparency needed to gain support of a large audience.

Scale: The scenario is design to operate globally. A scaled down version though could start in a local setting. Since the platform is completely voluntary it's no hassle to get started.

Moral: The moral discussion in this scenario is in some way avoided. The fact that human labor is worth money is generally accepted, also people can get involved in many levels and raise their voice if they don't agree to something or think things should go differently.

Taxation: The designers of the infrastructure don't value anything, the community will determine how the available credits will be distributed. It will be possible to value specific projects, areas or approaches.

Corruption: Another thing proven to be successful in collaborative initiatives is the moderation and corruption prevention. People stand up and take responsibility to get involved and to moderate the platforms behavior (look at the great success of the completely open wikipedia). Off course people might still try to manipulate the system but this has to be done in the open, transparent and will thus blink out, rather than with an institute.

Conclusions

The goal for this scenario was to make it bottom-up. The way money is distributed and thus how labour in support of environmental value is assessed can be a very interesting and new way of dealing with fund expenses. A platform like this can create a new basis for many creative enterprises etc. Although incentives might remain economical, the product is always labour in support of the environment.

To keep it 'voluntary' and not forced upon by a large institute, philanthropy was chosen in this scenario. A disadvantage of this mechanism is that the amount of money that comes in is uncertain and that promotion is needed to guarantee incomes.

Scenario validation and discussions

Evaluation

The three scenarios were used to evaluate their consequences and to find issues and inspiration during two validation sessions with economic experts. The first session was with three economist with a focus on macro economics and environmental economics. The second session was with an economist with a more sociologic background.

Environmental economists

The first session was conducted with three Ph.D students in macro economics from the department of Economics at the University of Tilburg, Peter van Oudheusden, Christian Bogmans and Jan Stoop. After a short explanation of the project, the three scenario boards were presented. Per scenario, important remarks are described and some overall remarks on the project as a whole.

Eco-interest: The eco-interest scenario was met with enthusiasm, especially the idea of the feedback loop: As the environmental assets increase in quantity, the value goes down. The other way around is also true. This is a logical step: if there is not much environmental value, then it is very important to help preserve this. The actual value corresponds with this system. The link with the 'real' economy becomes very clear.

However, introducing a new currency will bring another loop into play. The value of the new currency will rise when one or two of the following conditions occur: The economy grows, or the environmental assets shrink. This implies that from a pure economical standpoint it would be a good idea to gather eco's with environmental assets, and then make money increasing the economy and destroying said assets.

It was stated that value is always relative, it has a relation with something else. It is not possible to determine the value of an asset, if you have nothing to compare it too. Therefore, especially in this scenario, it is important to distinguish environmental value and environmental assets.

Another, more practical, remark was that if the interest rate only depends on the amount of users, the money in the fund should be regulated.

Stewardship: This scenario was seen as the most realistic and easy to implement. A good point about this scenario is that there is a lot of potential to implement it on small scale. A market is created, and this is good for an economic model.

There were problems however, and most of it have to do with corruption. How can one check if the project that is proposed is actually done? There should be some kind of peer review or a quality control setting. A project that was proposed immediately was how much money it is worth when I do NOT kill a baby seal. How is the prevention of blackmail is the question that rises. Is there an incentive to vote? Why should people vote? What is the benefit? How big is the problem when you don't have any control on where your money flows? There are a lot of holes in our story still.

Another kind of problem was also addressed: our proposed source for money is philanthropy. But is it durable? Nowadays, companies do a lot of charity, but in the end it is a means to get better PR. What is the incentive of companies to keep the flow of money coming? Also, will it be enough money to pay for all the projects when the project is at full steam, or should we be looking for other sources of money.

Although this is very realistic and good critique, it is actually a good thing that it is about the details: the overall picture seems solid.

Bio-Standard: Although the starting point of this specific scenario was found very interesting (replacing the gold in the gold standard with environmental value - effectively linking the economy with the environment) it is very hard to discus it further, because the consequences are very vague and difficult to grasp. It is a nice gimmick, but does not go much further than this. As a comment on the Tobin tax we heard the question that why the Tobin tax should be linked to the benefit of the people. This connection, although very clear for us (economy grows in a finite environment) was not so clear or simple as we imagined.

There was not so much in depth feedback on this story and it's implications further on.

Overall: They really felt that we, as designers, could add something in this project. Even though they were macro-, and environmental-economists, they don't focus on the overall picture, but instead zoom in on very small parts of the entire system. To get a broad birds eye perspective is very useful.

There are economists who do that, but usually those are called ecological economists, like Herman Daly. It is very difficult to get on a common ground between these two worlds - far off and close by.

There is a big difference in asset and value. An asset is something you can own, and the value of that asset is always relative - determined by the asset and it's relation with it's surroundings, environment and alternative.

While we tend to think that money is created by printing out some bills and handing them out, it is a little more complex than that. Value is created by creating new products, and money is needed to trade. Money is the 'oil' of the economy. Imagine being a car salesman, and having no money around. That means you have to go to the bakery once every month to swap one car for one hundred loafs of bread.

Willem Middelkoop, writer of the book 'De dag dat de dollar valt' is not taken seriously in economic circles. He is too unspecific, and

although he has some valid points, if the only thing to back it up are amusing anecdotes nobody is convinced.

The economics were really looking for holes in the systems, and ways to manipulate an corrupt them. This is a useful lesson as we tend to overlook these things.

The environment is, from an economist point of view, an 'external effect'. If production needs to grow, than an external effect is that a piece of forest has to be cut down. Bringing them back into the chain, and taking this into account when calculating the costs of the product is called 'internalizing the external effect'. There are some developments in this direction.

Expert Olav Velthuis

Olav Velthuis is sociologic economic, his last book 'imaginary economics' is about how contemporary artists represent economic process. Through this and other work, Velthuis knows about economics and 'the bigger picture'. This experience and point of view is very interesting for our scenarios. The scenarios are designed from a period of short research and they try to cover various different answers to the eleven main questions. By having Velthuis shine his light upon these scenarios, hopefully we will get a better view on what the implications of the various scenarios will be within the context of a global economy.

Similar to the meeting with the macro-economics PhD students, this meeting, after presenting the main problem and research question, each of the scenarios was discussed inviting Velthuis to react on the scenarios, trying to find how he thought these scenarios were lacking of anything. In this section per scenario, the main reactions of Velthuis are discussed.

Eco-interest: Olav Velthuis' main comment on this scenario was about the similarities he noticed with the REDD program of the United Nations. The problems we saw in assessing the value of the environment were not apparent to Olav Velthuis. He mentioned that environmental value is assessed every day. When damage is done to environmental value, in lawsuits a price is given to the damage. Also in the REDD program, methods are used to asses the value of environmental asset.

The new currency was not a good plan according to Velthuis. He mentioned that a new currency comes along with new uncertainties, this would make the financial mechanism unnecessary complex. The communicational benefits of a new currency were not appreciated as such.

While talking about communication, Velthuis mentioned another import role of communication. He mentioned that the UN and other institutes already do a lot of good work into making environmental asset economically valuable but this was not communicated to people. He stated that the way money flows through these institutes should be communicated in a better way. A raise of tax is seen as an negative thing, Velthuis mentioned that if people would know how this tax raise would be used, people would not complain.

In other words, this scenario, according to Olav Velthuis was nothing new. It is already done in other ways with the same result, he mentioned that designers might find a role in visualizing and communicating this to gain more global support.

Stewardship: In this scenario, the way of taxation: paying for labour rather than for environmental assets was an important aspect. This aspect was not valued as such by Olav Velthuis, as mentioned before, he didn't have a problem in assessing environmental value as we do it every day.

Olav Velthuis doubted whether philanthropy would be a good way to fund the platform. He doubted whether companies would be interested in donating money without control on how the money is spent. For PR reasons companies want to be related to a certain kind of projects.

The collaboration was seen as an interesting concept but Olav Velthuis doubted whether people would vote for the right projects. He mentioned that it might well be that people vote for cute animals and appealing jobs, rather than the true important jobs. Although he appreciated the concept of collaboration, Olav Velthuis doubted whether it would be successful.

Bio-standard: Similar to the reaction of the environmental economist, Olav Velthuis mentioned that the idea was to unrealistic to give in depth feedback upon. He mentioned thought that gold had properties environmental value does not have; it is trusted and accepted globally as valuable, this trust lacks with environmental value.

When the possible results of the scenario were discussed (insufficient environmental value to keep the economy growing) Olav Velthuis mentioned a very basic rule about money; M*V = P*T (ammount of money times velocity equals the prices times the number of transactions). This formula shows that if M would decrease (less money added to the system because environmental value is insufficient) it would not necessary mean that the economy could not longer grow. If the

velocity of transactions would increase, the economy could still grow. The assumption that the amount of money represents the size of an economy is not necessary true.

Economist Conclusions

In general the feedback from the economists was optimistic. With the limited economic knowledge this project was started, the insights shown to the experts proved to have economic body and showed new insights outside the regular field of the economists. The combination of this proved to be very interesting and positive.

During both sessions it became clear that the bio-standard scenario was not realistic. Both experts appreciated the thought experiment that was created but had difficulty to give more useful feedback on the scenario. Main aspects were that gold en environmental value do not have the same properties vital for a foundation of a currency such as not re-produceable, scarce and durable.

The reason to introduce a new currency was not clear to Olav Velthuis, also the environmental economists had their questions about this. It might create an incentive to destroy environmental value and it would make things unnecessary complex. The taxation and moral question that caused for many discussions when exploring the subject were no real problem for the economics. Olav made an interesting remark how we already do it everyday (e.g. in lawsuits). The environmental economics were positive about the eco-interest scenario, Velthuis though was not so impressed. The concept of valuing environmental value in this scenario was not new.

It was clear that both Olav Velthuis and the environmental economists were the most positive about the stewardship scenario. The combination of an economic mechanism with a bottom up approach was new to them and contained interesting insights. Especially the environmental economists mentioned that the creation of a new market is an interesting aspect of this scenario. The fact that it could be implemented on a small scale and in a different context appealed to both experts. Olav Velthuis was interested in such a scenario for other foundations; transparency in the money flow.

Internal reflections

Like the economists, within the project contributors it became clear that the bio-standard was an interesting thought experiment. It would be unrealistic to continue with that scenario.

From the conversations with the economists and became clear that the biggest contribution we could make was in the context of the stewardship scenario. The scenario responds to the trend of collaboration. This scenario might lead to more transparency and that it could be an inspiration to apply the aspect of collaboration to more financial systems.

Another import contribution in the role of a designer is the communication of an idea. The new currency as proposed in the eco-interest scenario is a interesting example to explore. However, this scenario raised many new questions as well. Most of these question were about the trustworthiness of the collaborative platform, many practical questions as to how the platform would work came to the surface.

The funding aspect of the stewardship scenario was still vague and it is unclear how much money this would raise. This part could also be combined with the eco-interest scenario where a global tax forms the source for the economical mechanism.

Scenario IV: Next Iteration

Low fidelity prototype

A small scale, experimental set-up was organized to get feedback on the project from several students and experts with a design background. During this exhibition many of them provided useful input, mostly regarding conceptual choices in the system design. A low fidelity prototype was built to test the collaboration and corruption aspect of the stewardship scenario.

Setup

Apart from an explanation of the entire scenario, the voting part was tested in a playful matter. Apart from expert evaluations, scenarios are also very useful to act out part of the scenario. Using richer modalities rather than only a conversation will provide new insights.

The voting part was very much simplified in the low fidelity prototype. With a print out of the world map, flags that represent projects and lego, participants were invited to join in with the platform. Participants could vote for a job proposed by someone on the world map (indicated with a numbered flag on the map) by placing lego near the flag on the board. The amount of lego given to the participants was limited to 3 pieces to force a decision. Participant could also propose an new hypothetical job to promote on the platform. This could be done by text and with a visual.

Apart from the voting behavior and projects proposed by the public, another goal was to see how participant would respond to certain kinds of jobs already proposed on the platform.

The setup of the experiment.

blog.eco-currency.net/category/scenarios/

Different jobs were initially placed on the platform to test certain assumptions which became apparent during the internal reflections and the expert evaluations. These assumptions were:

Bad and unclear communication of jobs will lead to fewer votes.

The like factor will play an important role in peoples voting behavior.

The platform will be vulnerable to blackmail.

Unattractive but potentially very important projects will receive fewer votes.

Evaluation

After this iteration of the scenario there were useful comments and feedback. The low fidelity prototyped concept as described in the previous chapter was tested with a group of students and professors.

Our assumption according cute animals which would gather lots of votes just because of it's cuteness, was totally false. A possible explanation is that the group that we tested with is not representative and focusses on other things.

It was clear that the projects that were proposed early in the test had a big advantage. Not only did they have far more time to gather votes, also because there were already votes on the projects, people tend to vote for those projects more.

The amount of votes that different projects gathered were totally out of balance. A proposed project by a teenager managed to get more than double the votes than the amount that greenpeace got. Voters didn't have an indication how much somebody was asking for, and what he or she already gained.

The ability that the participants had to add different projects themselves did very much spark their creativity. A lot of different directions were explored: from very unpractical projects such as calling for aliens for help all the way to set up a green-car lobby. The most important observation was that there was discussion starting: people trying to explain their solution and convincing others why it is important.

This community building looks like a strong point. One assumption was to put a blackmailing country in the system. One participant saw through this, and immediately started a project to counter their efforts. In addition to that, he also warned other voters not to vote for that particular project. This is the kind of community check we are looking for.

A downside of the set-up was that, although the way to divide the funding between the project was very clear, the funding was not so well explained. There were a lot of questions about who should pay for all the projects.

Conclusion

During the test, practical issues of the voting platform became apparent. Most important were that the number of votes should be limited to match a realistic salary for a job; it should not be possible that a single person who's doing a few hours of appealing work gets more money than he could possible spend.

Also projects that were added to the platform later in time should have equal chances to gain votes. Votes should be reset periodically.

Assumptions about voting behavior often turned out wrong. The participants sample this test showed more nuanced voting behavior than predicted. Also the benefits of a community open for discussion and feedback became apparent. People were actively involved with voting behavior of others and were sharing thoughts about projects.

Scenarios wrap-up

Conclusion

The scenarios created made explorations explicit. Different decisions clearly led to completely new scenarios. The explicit manner in which the scenarios were presented, allowed economic experts to evaluate the scenarios. Overlap in the feedback from the separate experts indicated some assumptions to be rather unrealistic, others to lead to new insights. Because the scenarios were constructed from clear distinctions within the research questions, feedback on these aspects could be isolated rather simply.

A small scale experimental set-up invited design students and experts to review one of the proposed scenarios from a design perspective. Since the set-up took the scenario to a more practical level, conceptual feedback focused on the execution of some aspects. It suggested interesting opportunities for mechanisms like labour and collaborative valuation, but the need for a more sustainable solution for funding.

With a more realistic view on the optional directions that could be taken, a final proposition can now be made. This new combination will allow for a next level of concreteness which will conclude in recommendations for continuation of such a project.

4. Propo

osition

All information gathered and evaluated combined, leads to the proposition which is described in detail in this next chapter. This proposition combines some core insights gathered in an implementable way. It is not a definite conclusion of the research as such but rather a way to contextualize some of these insights to enable a more practical discussion. The concept is not final, and several aspects are still open for debate. However, this proposition can be seen as an example of how the insights gained in all the research could be made into a real concept and it gives an indication of what it takes to further realize such a proposal.

Concept

Meet Alberto. Alberto is a Brazilian farmer in the upper amazon, where he owns a piece of pristine rainforest. Alberto needs money for his daily needs in life and the forest is financially worthless, but if he burns it down and starts a soybean plantation on the fertile soils he can prosper.

Should we then pay him for doing nothing at all and let the jungle be? If so, how much is his piece of forest actually worth? What about his neighbor's plot? How does their rainforest relate to for example marine life or the existence of bacteria who's key importance we might not yet grasp? Is it even possible to price every single piece of our environment with no clue as to how it all interrelates?

Let's take a closer look at Alberto's rainforest. Take one tree for instance, we can use its timber to build houses and all sorts of other products. But this tree is much more than just wood, it is a home to many organisms including birds and rodents for example, but also plants, bacteria and fungi. These organisms feed on the tree. By eating its fruit and dispersing seeds elsewhere, a bird enables the growth of new trees, new forests. These forests regulate air humidity, provide rains and influence airflows. They are the cornerstone of the climatic balance on which we all depend.

So can we ever determine how much this one tree is actually worth, for it is not just the tree we are appraising. It is one of the millions of keystones of our livable earth; without it, we would not survive. Existing systems like carbon trading do value measurable environmental properties. Although they link economical value to specific parts of our environment, these systems leave the millions of unknown interrelations that make up our biosphere out of the equation and are thus incomplete and morally unacceptable measures for our environment.

We conclude that it is impossible to attach any absolute monetary value to individual instances and their role in our complex environment, even though their combined value is evident. Instead we propose to economically value human labour in support of the environment and pay Alberto to sustain his forest.

Now who is going to pay Alberto for his new job? In order to balance the environmental and economical ecosystems, a growing economy feeding on the environment should provide the financial means to stimulate growth of that same environment.

Some existing systems are based on the polluter pays principle in very direct ways. Carbon emitting companies for instance, have to obtain the permits to cover their own emissions. If we want the economical ecology as a whole to pay, we should consider much more general taxes. Reasonable financial mechanisms already proposed, including the Tobin tax and, more recently, the 'Robin Hood tax', could realize billions of Euros each year.

But who will decide how all this money is fairly distributed over all biosphere stewards?

An interesting recent movement hints a new approach to administrate complex organizations: collaboration. Infrastructures that allow for collaboration to emerge prove to have the potential to break down the barriers of existing institutions and reach the same goals in a more efficient and transparent manner.

With sufficient funds and a transparent way to organize their distribution, it is now time to economically stimulate labour in favor of the environmental ecology and thus rebalance it with the human ecosystem.

We propose an online platform on which everybody can post their job in favor of the environment. Everyone can think of something, within their power, to work on. Ranging from Alberto sustaining his forest to deep-sea biologists diving for new, key bacteria. Stewards can describe their jobs on the platform, support it with pictures, videos and comments to strengthen their claim for salary.

All people on our planet can get an account on the platform. Monthly, each account receives a set amount of ecos, the platform's own currency. Members can distribute their eco's over the jobs they find important. The value of an eco is the income raised by taxes divided by the total amount of ecos issued to jobs and therefore fluctuates. Only at the end of each month, stewards cash their ecos for local currencies.

The platform will spark new, creative initiatives. An entrepreneur might find it lucrative to represent Alberto and other farmers in his area and promote their jobs on the platform. Numerous examples on how to tackle corruption through social control can be taken from other online experiences, think of fora, blogs, rating systems etc.

The platform will open up a new marketplace which offers economic incentive to invest in the environmental ecology. As long as our economy keeps growing it empowers this incentive, this connection has the potential power to rebalance the human and biospheric ecosystems.

Scenario

This scenario will explain how it could work for different stakeholders, when the platform as envisioned, is operational.

Alberto, mentioned above, can make a living by burning his forest down, selling the wood, and starting a soybean plantation. However, he can now start a economically lucrative job on the platform as well. He would propose his own job. In this example guides scientists to explore the forest in search of new medicine, whilst keeping the forest intact.

He can upload pictures, comments and recommendations from the scientists to his job, providing the worldwide community with evidence that he is actually working. His reputation will rise as his account gains credibility, and more people will pay him, with ecos. This way he can earn a living, while his reputation continues to grow.

Stuart is a scientist. Through the platform he found Alberto to guide him through the forest. Because Alberto knew the ins and outs, he could make a nice reportage. He gave good feedback and posted his documentary. Stuart recommends this guide to his fellow scientists.

Mary is a secretary who lives and works in New York. On a holiday she saw the destruction of the rainforest, and got passionate about helping. On the platform she browsed for different projects and found Alberto's cause. Because his project already had some recommendations, and good feedback, she decided to pay her eco's to his job.

Alberto's network begins to grow, and he can now make a living preserving the forest. The other stakeholders continue to actively participate in the platform, and inspire others as well.

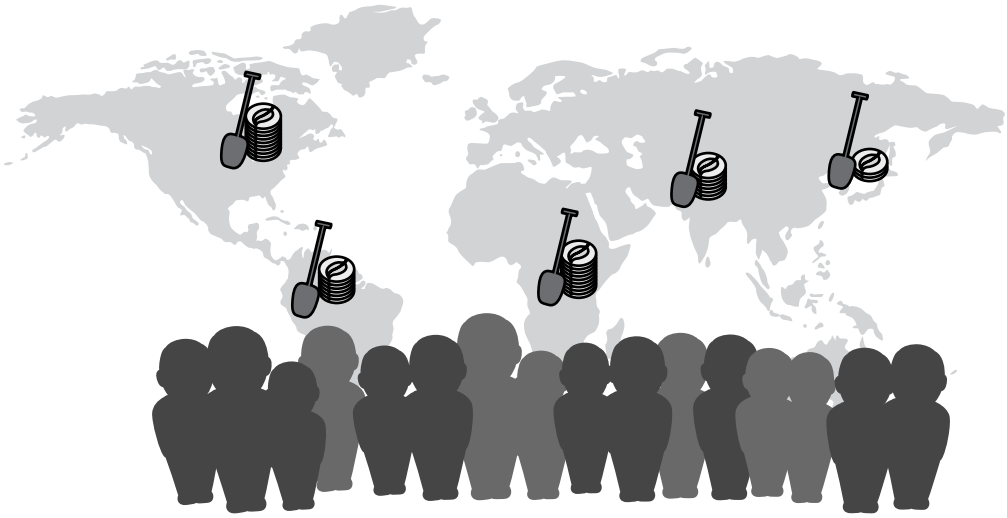
All the elements that are part of the concept, and appear in the scenario are elaborated on in more detail below.

Ecos

The currency that is used on the online platform is called the Eco. All transactions, placement and trading are expressed in eco's.

The way they are used in this concept, is comparable in the way votes work on other online platforms. However, by conceptually making the votes into a currency, the link to the real economy and the money that back this up, is more clear. Instead of voting, you are truly awarding funding towards a project by giving an eco.

Also, because they are backed by real money, an eco is actually worth something, and exchange rates can evolve.



A collaborative platform where jobs investing in the environment are valued by a global community

Being involved with the platform and using eco's fits todays trend to show that you are environmentally aware. The use of eco's might go beyond the online platform and reach a social acceptable status.

On the platform. When joining the platform, each user gets 10 ecos per month. Users can spend their ecos on jobs, invest them in investments or donate them to other users. Ecos represent a relative value. The value of one eco is the available amount of money divided by the total amount of ecos spend. After the 'time to balance', each month, the jobs receive the value of the ecos in a local currency. Users will receive 10 new ecos.

There is also an option to give your eco a 'sticky'. This means you automatically give a job an eco per period. This can be useful to support projects for an extended period of time.

The amount of ecos you receive can depend on two things. People can donate their ecos to you. This effectively grants you the right to spend more ecos. Also, when your reputation goes up - this is decided by the community - you can get more than 10 ecos to spend every month.

Every period you get the allocated amount of ecos that fit your profile. You cannot save ecos. This is to prevent the case that one person makes an account and doesn't do anything for a year, after which he pays all the ecos to his own job. to summarize, ecos you don't spend are lost.

Community

Users. You must register as a user to participate in the platform. Then you are linked to an account, which is always public and shows statistics like voting behaviour, comments, background etc. Also completed jobs, funds received and recommendations are visible.

Community. Per item in the system, whether this is an account, job or investment, there is a message board in which everybody can post questions or comments. This helps getting feedback, credibility, and shows commitment. This is a way to involve the community, but also gives the community a place to validate the item.

There are several different view modes. You can select similar projects, other jobs per user, recommended views, best paid projects, investments, etc.

The point of the whole community based platform is to put the power in the hands of everybody. The open structure of the platform supports this. Many examples showed how this principle works towards reaching a goal. Whereas wikipedia was expected to fail, the

strength of a community resulted in an online encyclopedia which caused institutional companies like Encarta to go bankrupt.

An open community where hierarchy is not apparent and where everybody can moderate and administrate has proven to result in dedicated users who are willing to put effort in maintaining and extending the platform. With the right promotion and infrastructure, the online platform should attract an enthusiastic core of users who take responsibility.

Jobs

Jobs and investments. A job is any activity or labour that sustains or invests in the environment. It might be that people need a start capital or need to do large investments in order to fulfill this job. There are three main different options to incorporate these needs for money in the system.

Only Jobs: Every month a fee is received. Looking for investment capital is the responsibility for the job owner. The system is usable to network and find people who are interested, but finding funds for investments is not taken into account.

A downside of this option is that it is very complex for a job owner. Actually working on a project becomes limited because of the bureaucracy. It is difficult to start and get an investment because there is no funding available.

Jobs and Investments: Jobs are continuously paid every period. Investments are static separate projects which are only paid out whenever the target investment is reached within the time limit.

This option might make it easier for corruptors to get away with money. Simply proposing a project and asking for an investment can generate money. Just never start the project and the cash is yours. Collaborative moderation can be an answer to this.

Jobs with increased payment: A job owner can increase his monthly goal. With the correct argumentation he can receive extra funding, and save it until he has met his desired investment.

A major setback of this alternative is that it doesn't matter whether or not he receives enough money to start his project: he will still get the extra money. If the investment goal is never reached, the extra money will be paid without supporting the environment.

The best option is the second; Jobs and Investments. This option seems to be the best alternative, and similar projects and examples can be found.[39]

For each user on the platform, the eco's a user can pay to jobs and his/her payment history are shown. The jobs and investments, a profile and a rating show the users activities on the platform, the community can discuss the credibility of the user and pay for his/her jobs and investments.

Jobs are paid monthly, job owners request a certain amount of salary per period. The amount actually paid can fluctuate, according to the amount of ecos that are given by the community. However, the total amount of money payed to the job owner is limited based on a percentage of the requested paycheck. This will make sure a farmer will not be a millionaire because there has been an abnormal amount of votes on his job. The money that is left after the job has been paid goes back into the systems reserve. This way the next time jobs are payed out, the ecos are worth slightly more because the reserves will be higher. This way the community decides (in the next period) what to do with the surplus money.

Monthly balance time. Each month the gathered ecos per job are exchanged for local currencies. This is done periodically to keep in synch with the monthly pay that is custom for laborers in many countries. Ecos are distributed among the users again.

Funding

Dividing the Ecos. After each period the ecos earned for a job are paid out in local currency. Money per investment is put aside in a 'savings account'. Each month the number of ecos is reset. The money earned with the labour goes to the job owner, even if the desired amount is not met.

When it comes to the investments, the earned ecos are not directly payed to the requester. If someone needs an investment of one million dollars to build a windmill park, and is only able to raise half, he will not be able to build it. So an investment needs to have a goal and a timeframe. If, when the deadline is reached,

> "The Robin Hood Tax will not impact on personal banking or on retail banking. That's because it targets a distinct area of bank operations – high-frequency large-volume trading, undertaken by financial institutions in the 'casino economy'.
>
> If you change money to go on holiday, send remittances abroad, invest in a pension fund or take out a mortgage, you will not be affected by this tiny tax."[15]

there is not enough money, the money will go back to the systems reserve. This is an all-or-nothing funding concept. If the goal is not reached before the time expires, there is no exchange of eco's for money. A project must reach or exceed its funding goal, otherwise, no money will be payed out. This stimulates the project proposers to sell their project and to think about how much you really need and is realistic to ask. This system we propose for this is very similar to kickstarter.[39] where a similar system has proven to work out well.

Income. If a global market like this platform is created, funding should be of a global scale. Two different financial mechanisms are explored following from the expert evaluations and initial explorations.

Global tax. The first solution is a global tax. The size of this tax represents the size of the economy. The bigger the economy, the larger the amount of money in the platform's reserve. There are several realistic options how this tax can be introduced. Examples of such global taxes are the Tobin-tax[11], and the Robin Hood Tax[15].

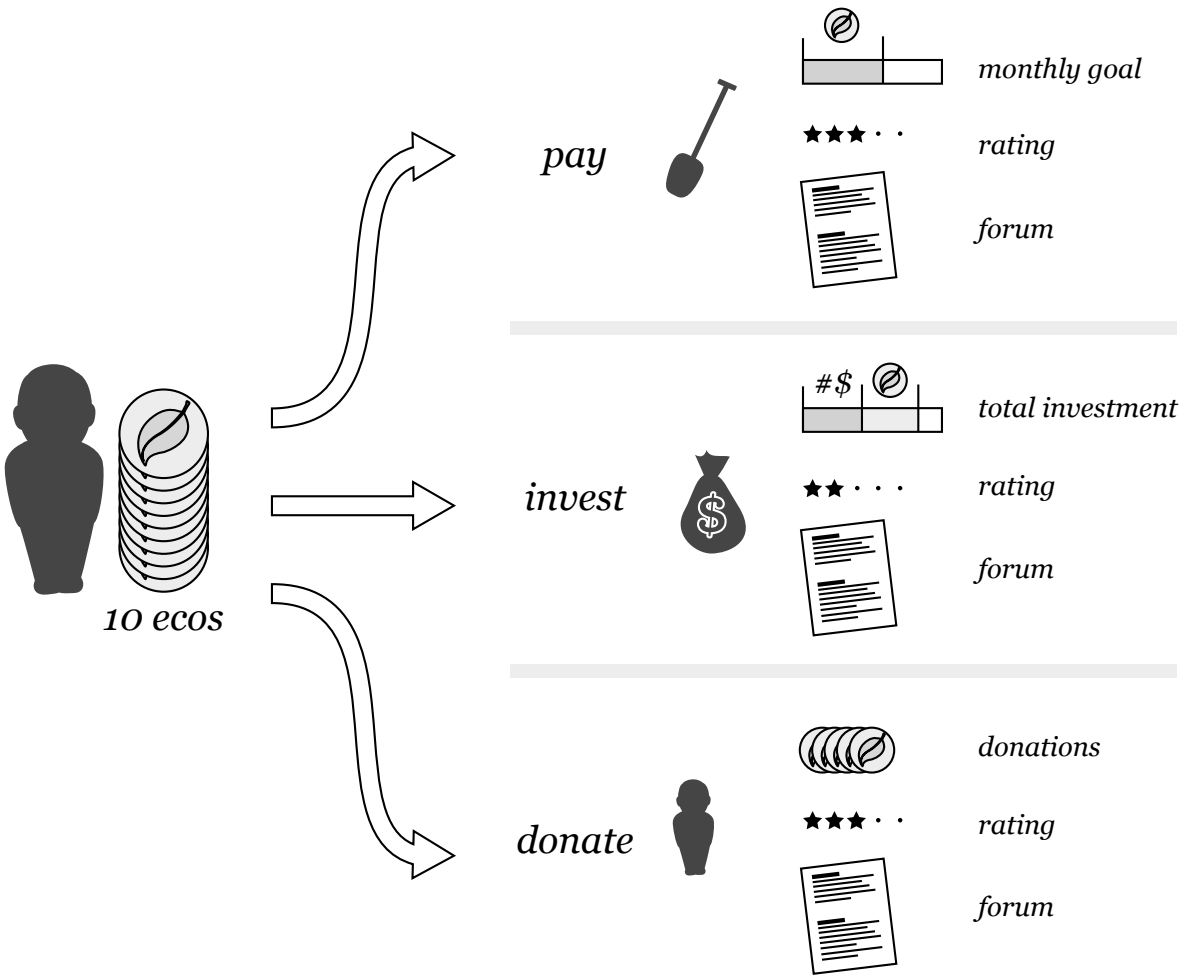
However, these taxes were not invented or proposed to be a measurement for the economy. Tobin tax is a currency transaction tax proposed to put a penalty on short-term currency transactions to reduce disruptive speculation in the forex market by raising the costs of such speculations. In other words, the Tobin tax is not about generating revenue, but about stabilizing the market.

The Robin Hood tax that was recently introduced is conceptually similar to the Tobin tax, but broader in scope. They do not only propose the taxation of the Forex market, but incorporate an array of other aspects as well. Also, there is a clear communication and symbolic aspect. It exists on Facebook, and has prominent celebrities star in their promotional clips.

Although these two alternatives are not design to fit the platforms' needs, they do suggest these kind of global taxes are a viable solution.

However, there are also some doubts and problems with this approach. A tax on the forex market or banking world is seen as a measurement for the size of the economy. But how accurate or true is this? What about the 'virtual' economy? The online sector is getting bigger and more influential every day.[40] How is the 'size' of an economy measured? Another question is if this tax is a valid measurement. If not, how can it be altered to make it fit to be a measurement?

Another big point of doubt in this system is that it doesn't stimulate good behaviour. If you own a company that works in favor of the environment, that company will pay the



A user can do three things with his/her ecos, pay them to jobs, invest in projects or donate them to other users.

same tax as a very polluting one, Companies and entrepreneurs alike do not receive any benefits when trying to do something good for the environment. However, money can be reclaimed by putting the work on the platform, explaining why it is important and via that way generating income.

Internalizing external effects. This method[41] consists of something entirely different than a global tax. As opposed to a global tax, which is the same for all companies, this method describes a system where all the companies are evaluated individually. In essence, this means that if a company puts a big strain on the environment, it has to pay more. This is already happening in some different forms: subsidizing green cars, and paying extra for polluting chemicals. Also the carbon credit scheme is an example(see carbon credit explanation on page). However, this only takes the CO2 in consideration, whereas there are many more aspects and effects that are important in the environment.

This method will have a big influence on the way taxes are managed nowadays. Every company has to be assessed on all the aspects in regard to the environment. This is a very complicated matter, and the question is whether or not any institution could do this job adequately. The economy is an ecosystem as well, and in many aspects equally complex. An option, which has not been investigated yet, would be another collaborative platform to determine this. incorporating this aspect in the existing platform. In a way this is already happening with this concept. By making an environmental friendly company, it can be put on the platform as an initiative to help the environment.

It may stimulate 'good behaviour', the question, however, is in which way this system will truly stimulate 'good behaviour'. Previous legislation to internalize external effects often stimulated creatively bending the rules to increase revenue, as pointed out during expert validation.

"In many cases internalizing costs or benefits is not feasible, especially if the true monetary values cannot be determined."[42]

39 Kickstarter. Web. http://www.kickstarter.com/

40 Barua, A.; Shutter, J.; and Whinston, A.B. Measuring the Internet Economy. Center for Research on Electronic Commerce (CREC), University of Texas, Austin, 1999

41 Johnson, Paul M. "A Glossary of Political Economy Terms." Web. http://www.auburn.edu/~johnspm/gloss/externality

42 "Externality Encyclopedia Topics." Reference.com. Web. http://www.reference.com/browse/externality

4. Concl

lusion

It is important to note that the proposition as presented in the previous chapter is merely a possibility for future thought, a possible result of the research this project has done. However, it is interesting to reflect this final proposition on the eleven sub questions as stated at the start of the project and answer them in a strict and explicit way. As the role of these questions has also been subject to change during the course of this research, the order in which they are answered reflects their role in this proposition.

Are we ready to make environmental value explicit?

No, it is impossible to differentiate between separate explicit instances of the environment and value them individually. We can however, value human labour in support of that environment.

How to fund it?

A global tax over the world economy should provide the financial means to pay for this labour.

Can it be introduced loacally or only globally?

In order to balance economy and environment, the world economy as a whole should be taxed. Both ecosystems are so complex and interrelated that it is impossible and irrelevant to divide them with human borders.

How, and by whom should it be introduced?

The global tax feeds an online platform. Although this platform needs to be run, it will not be responsible for dividing the funds itself. It is important that this organization is not bound to any nations, to allow for its independence.

What is counted as environmental value?

Although environmental value as such isn't valued, a distinction between the different jobs in support of the environment still has to be made. The global community will value several jobs as presented on the platform.

How to administrate?

The transparency of the online platform will stimulate stewards to provide the necessary information to convince the public of their value.

How to limit corruption?

Social control within the platform as well as outside will determine the credibility of the users and job proposers.

How does the eco relate to other currencies?

A growing economy will raise the value of the eco, a declining economy will make it fall. A high eco will attract many people to work in support of the environment (shrinking the economy, declining the global tax), until it becomes less lucrative and people start growing the economy again. This way forces of supply and demand create a new balance between the economy and environment as we know it today in a new marketplace.

How will moral incentives blend with economic incentives?

With reasonable economic incentive to start working in support of the environment, proactivity and creativity in finding jobs will be stimulated.

How and where should the eco currency be promoted?

Although this will be different for different regions around the world, the platform will be clearly presented as a place for jobs, with wages and the eco.

What can we learn from existing CO2 trading systems?

The system is not run by any government, both multiple suppliers and demanders will form a true marketplace. The principle of protector receives is clearly adhered to.

The Three Pillars

With the eleven subquestions answered, the research managed to shine a light on the broad area of an eco-currency. The many aspects are put into perspective and a large base of resources are provided. Evaluating all the steps taken leads us to conclude that, although the details and implementation varies, the most important part of our proposition, and research project, can be described in three key-aspects. These key-aspects are the corner-stones, or pillars, on which the introduction of the eco-currency in our view should be based.

Global tax

In order to balance the environmental and economic ecosystems, a growing economy feeding on the environment should provide the financial means to stimulate growth of that same environment.Reasonable financial mechanisms already proposed', could realize billions of Euros each year.

Human labour

We conclude that it is impossible to attach any absolute monetary value to individual instances and their role in our complex environment, even though their combined value is evident. Instead we propose to economically value human labour in support of the environment.

Collaboration

An interesting recent movement hints a new approach to administrate complex organizations: collaboration. Infrastructures that allow for collaboration to emerge prove to have the potential to break down the barriers of existing institutions and reach the same goals in a more efficient and transparent manner.

Future work

The research provided in this report is a first step into a possible introduction of an ECO-currency. It is clear that the proposition provided is merely a concretization of the research and opens up a world of new questions. The proposition shows that many practical issues still need to be researched, designed for and validated. Future projects could use the foundations this project has laid, to dive into these new questions, and continue the rationale.

Apart from this report, sources in support of this research are presented in an online blog, open to everyone to be inspired and triggered to continue with the thoughts and background this research provides.

To convey the importance of this research and the potential of rethinking the balance between the environment and the economy an animation video had been created and promoted online. A special website is created as a portal for this project. The three pillars which conclude the research are visually explained to inspire people and to spread the basic message. This report provides an overview of related topics and suggests directions for the project to be taken further. It reveals the great potential for future mechanisms to value our environment in our economy, steps remain to be taken towards this new balance on earth.

References

1. Rosson, M.B. & Carroll, J.M. (2002), "Scenario-Based Design", Chapter 53 in J. Jacko & A. Sears (Eds.), The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies and Emerging Applications. Lawrence Erlbaum Associates, 2002, pp. 1032-1050.

2. Katoomba Group, 2009. beyond carbon: biodiversity and and water markets

3. Vaughan, A. 2009. James Lovelock labels Europe's carbon trading scheme a 'scam'. The Guardian, 10 Mar

4. Shirkey, C., 2008, Here comes everybody: The power of organizing without organizations. Penguin press

5. Smits, W., 2009, Willie Smits restores a Rainforest. Presentation at TED2009

6. Tegenlicht, 2010. Waar is de woede: De wereldeconomie is in crisis, maar waar blijft de woede? VPRO

7. Palley, T.I.,2003. The economic case for the Tobin Tax. Debating the tobin tax

8. Shirky, C., 2005. Clay Shirky on institutions vs. collaboration. Presentation at TED2005

9. Blankesteijn, M., 2010, Rimboevolkjes ontdekken internet, De Pers, 26 Mar. p. 10

10. Kaynes, M.J., 1936, The General Theory of Employment, Interest and Money. MIT press

11. Weaver, James H., Randall Dodd, and Jamie Baker. "Scenario-Based Design." Debating the Tobin Tax: New Rules for Global Finance. Washington, D.C.: New Rules for Global Finance Coalition, 2003. Print.

12. Dodd, Randall. (2002) "Lessons for Tobin Tax Advocates: The Politics of Policy and the Economics of Market Micro-structure." Washington, D.C., FPF Special Policy Report 7

13. Griesgraber, J.M., New Rules for Global Finance Oxfam America in Weaver, James H., Randall Dodd, and Jamie Baker. "Scenario-Based Design." Debating the Tobin Tax: New Rules for Global Finance. Washington, D.C.: New Rules for Global Finance Coalition, 2003. Print.

14. Traynor, Ian. "Tobin Tax Could Fund Climate Aid under Proposals from UK and France." The Guardian. 11 Dec. 2009. Web. http://www.guardian.co.uk/environment/2009/dec/11/eu-double-climate-aid-2bn.

15. The Robin Hood Tax, http://robinhoodtax.org.uk/.

16. Shell Foundation, Trustees' report and consolidated financial statements for the year ended 31 December 2008

17. Portney, P.R. (1994) The Contingent Valuation Debate: Why Economists Should Care, Vol. 8, No. 4, pp. 3-17, American Economic Association

18. Milgrom, P. (1993), Is sympathy an economic value?: Philosophy, Economics, and the contingent valuation method, in Contributions to Economic Analysis, pp. 417 -441

19. Wilson, Edward O., 2007. E.O. Wilson on saving life on Earth. Presentation at TED2007

20. Partensky P, Hess WR & Vaulot D (1999) Prochlorococcus, a mar- ine photosynthetic prokaryote of global significance. Microbiol. Mol. Biol. Rev. 63: 106–127.

21. Wilson, Edward O. The Diversity of Life. Cambridge, Mass.: Belknap of Harvard UP, 1992. Print.

22. "Dollar-Based Methods." Ecosystem Valuation. Web. http://www.ecosystemvaluation.org/dollar_based.htm.

23. Shannon, C.E. (1948) A mathematical theory of communication. Bell System Technical Journal, 27, 379–423.

24. Wilson, Edward O. "Within One Cubic Foot." National Geographic Magazine - NGM.com. Feb. 2010. Web. http://ngm.nationalgeographic.com/2010/02/cubic-foot/wilson-text.

25. The Endangered Species Act of 1973 (7 U.S.C. § 136, 16 U.S.C. § 1531 et seq., ESA)

26. Benkler, Y. (2005), Yochai Benkler on the new open-source economics. Presentation at TED2005

27. Lean, Geoffrey. "Amazon Tribe Enlists Google in Battle with Illegal Loggers." The Independent. 13 Apr. 2008. Web. http://www.independent.co.uk/environment/green-living/amazon-tribe-enlists-google-in-battle-with-illegal-loggers-808492.html.

28. U. Döbrich, and P. Noury, "ESPRIT Project NOAH - Introduction", in D. Dietrich, P. Neu- mann, H. Schweinzer, Fieldbus Technology, Springer Wien New York, pp. 414-422.

29. Zetter, Kim. "Hackers Steal Millions in Carbon Credits." Wired News. 3 Feb. 2010. Web. http://www.wired.com/threatlevel/2010/02/hackers-steal-carbon-credits

30. Kravets, David. "Hackers Plundering Brazilian Rain Forest." Wired News. 12 Dec. 2008. Web. http://www.wired.com/threatlevel/2008/12/hackers-plunder/.

31. Rushkoff, Douglas. "Edge: Economics Is Not Natural Science By Douglas Rushkoff." Edge. Web. http://www.edge.org/3rd_culture/rushkoff09/rushkoff09_index.html.

32. Middelkoop, Willem, and Sander Boon. Als De Dollar Valt: Wat Bankiers En Politici U Niet Vertellen over Geld En De Kredietcrisis. [Amsterdam]: Nieuw Amsterdam, 2007. Print.

33. Henderson, Hubert D. 1922, Supply and Demand, At the University Press, Cambridge University, Nisbet & Co. LTD. London.

34. Lietaer, Bernard A. The Future of Money Creating New Wealth, Work and a Wiser World. London: Random House Business, 2002. Print.

35. Webb, Tim, and Terry Macalister. "Carbon Trade Wrong, Says Lord Browne." The Guardian. 8 Mar. 2009. Web. http://www.guardian.co.uk/business/2009/mar/08/oilandgascompanies-carbon-emissions.

36. Verchot, L. and Petkova, E. 2009 The state of REDD negotiations: consensus points, options for moving forward and research needs to support the process. Unpublished manuscript. CIFOR, Bogor, Indonesia.

37. Hardisty, D., Johnson, E. J., & Weber, E. U. (in press). A Dirty Word or a Dirty World? Attribute Framing, Political Affiliation, and Query Theory Psychological Science.

38. "Transparency and Open Government." The White House. Web. http://www.whitehouse.gov/the_press_office/transparencyandopengovernment/.

39. Kickstarter. Web. http://www.kickstarter.com/.

40. Barua, A.; Shutter, J.; and Whinston, A.B. Measuring the Internet Economy. Center for Research on Electronic Commerce (CREC), University of Texas, Austin, 1999

41. Johnson, Paul M. "A Glossary of Political Economy Terms." Web. http://www.auburn.edu/~johnspm/gloss/externality.

42. "Externality Encyclopedia Topics." Reference.com. Web. http://www.reference.com/browse/externality.