INTRODUCING GUIDELINES FOR ECO-DYNAMIC DEVELOPMENT & DESIGN

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Abstract: One of the key activities within the Building with Nature innovation programme is the development of a guideline for Eco-dynamic Development and Design. This guidance will be focussed on implementation of the Building with Nature principles throughout all of the stages of hydraulic engineering projects (initiation, planning & design, construction, operation & maintenance).

The guidance is based on knowledge and experience from within the building with nature innovation program as well as on external sources. While a small group provides the main structure of the guideline, all participants in the building with nature program do contribute. To facilitate this collaborative writing effort, and to provide users with instant feedback on their and other user's contributions, use is made of web-environment very similar to that of wikipedia.

This contribution (1) outlines the way this collaborative effort is designed and integrated within the Building with Nature programme, and (2) illustrates its progress based on a number of practical contributions already available.

Keywords: building with nature, guideline, eco-dynamic development and design

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1 THE BUILDING WITH NATURE PHILOSOPHY

With 80% of the world's population living in lowland urban areas by 2050, climate changing, sea level rising and societal demands increasing, surface water infrastructure development in those areas is facing new challenges.

People and economic activities keep on concentrating in large urban areas, mostly located in coastal, deltaic and riverine areas (named 'deltaic areas' hereafter) (Cohen et al., 1997). Not only do land and water use in these urbanizing areas intensify dramatically, also flood risk and climate sensitivity are significantly enhanced. Moreover, society increasingly demands for safety, prosperity and sustainability (Vitousek et al., 1997; Ehrlich and Ehrlich, 1997).

This demand cannot be met without developing new infrastructures. Coasts need to be protected while sea level rises, rivers need to provide for safe conveyance of ever more extreme floods while remaining a suitable fairway for an intensifying transport, the capacity of harbours and access channels needs to be increased, the quality of water bodies and subsoil needs to be guaranteed, natural resources need to be used sustainably, etc. This puts increasing demands on the development of surface water infrastructures and calls for innovative solutions in project development, hydraulic engineering and water system management.

The past decades have shown that the realisation process of infrastructural works is characterised by the following developments:

- We want more (multifunctional designs, including environmental aspects);
- We know more (knowledge of natural systems has increased enormously); and
- We can do more (increased technological capabilities enable new approaches)

wheras at the same time:

- We have to operate more carefully (legal restrictions have increased);
- We have more difficulty getting things done (complexity of decision making has increased); and
- We have to meet increasingly complex functional requirements (modern society has high demands).

These developments bring challenges as well as opportunities. Building with Nature aims to meet these challenges by taking advantage of the opportunities offered by nature. It promotes solutions that reconcile the needs of society and the concerns for the environment with the growing societal demand for welfare and well-being. An integrated approach and stakeholder involvement from the early stages of project development onwards are essential features.

The essence of the approach is that surface water infrastructure development works *with* nature rather than against it. This requires a change in thinking, a paradigm shift in all aspects of project development.

1.1 A paradigm shift: from building in nature, via building of nature to building with nature

The relationship between surface water infrastructure development and the environment is shifting from minimizing negative environmental impacts, via neutrality by compensation, to optimizing on a positive balance. In other words: from doing not too bad, via doing no wrong, to doing good.

Early infrastructural works used to be realized without paying much attention to the potential environmental impact: ***building instead of nature***. In the 1970's interest for the environment increased and legislation was developed to make sure that environmental impacts were taken into consideration. As a consequence attention was focused on minimizing the environmental impacts caused by infrastructural works: ***building in nature***. Early examples of such projects are the Afsluitdijk (completed in 1932) and the construction of the Flevo polders (completed in 1968). The Delta works, with the construction of the Eastern Scheldt barrier (completed 1986) as the supposed pinnacle of impact minimization, mark the end of this period, at least in the Netherlands (Van Koningsveld et al., 2008).

Since the 1990's, European environmental legislation adopts the principle: prevention, mitigation and compensation of residual effects. The compensation of any residual nature loss yields a nature neutral approach, but also ***building of nature***. Legislation emphasizes preservation of existing nature and puts much emphasis on the precautionary principle. As a consequence, projects are still dominated by impact minimization, extended with mitigation and compensation measures. An example from this phase is the design of the Maasvlakte 2

project, which has been designed to minimize its environmental impact, while residual effects are compensated by additional nature development.

The next step in the development of hydraulic engineering is to create opportunities for development of new nature, up and above what is required for mitigation or compensation: ***building with nature***. The credo is no longer doing less bad, it now becomes doing good. Early examples are a.o. the Grensmaas project (2010 ongoing), where flood protection and gravel mining are combined with river restoration and nature development, and the strengthening of the Delfland coast (completed 2009), where nature development was used as a starting point for sustainable coastal strengthening.

In cases where natural processes have actually been applied to assist in creating (part of) a development one can speak of ***building by nature***. Examples of projects in this category are the Sand Engine Delfand (started 2011), where natural processes distribute sand from a large man-made deposit over shore, beach and dunes, and the Gorai Re-excavation Project, where dredging triggered natural river deepening, thus providing the Sunderband nature reserve with fresh water and creating new economic activity around the river.

Where opportunities for nature development are created one can speak of ***building for nature***. Examples of projects where this has been applied are the Eastern Scheldt revetment project (completed 2010) and the 'Levende waterbouw' cases: Rich Revetment and Harbouring Opportunities.

The usual approach to large hydraulic projects basically follows the steps:

1. Plan a project or activity,
2. describe the effects on the ecosystem,
3. optimize the design to minimize or mitigate detrimental effects,
4. compensate by building of nature, and
5. execute the project in strict adherence to preset norms and regulations.

The alternative, ecosystem-based approach, named Eco-dynamic Development and Design, boils down to:

1. Understand system functioning ('read' the ecosystem, the socio-economic system and the governance system),
2. plan a project or activity taking the system's present and envisaged functions into account (combining functional and ecological specifications),
3. determine how natural processes can be used and stimulated to achieve the project goals and others (using the power of nature),
4. determine how governance processes can be used and stimulated to achieve the project goals (using the power structures in place),
5. monitor the environment during execution, analyse the results statistically, make risk-assessments and - if necessary - adapt the monitoring program and/or the project execution (monitoring and adaptive management), and
6. monitor the environment after completion, as to assess the project's performance and to learn for the future (experience harvesting, knowledge development).

This alternative approach reflects the notion that the best choices from an overall project performance point of view are not necessarily optimal to the individual project phases (early project initiation, planning & design, construction, operation & maintenance). Rather should one balance long-term costs and benefits, in monetary and non-monetary terms. The transition to this alternative design approach is not trivial and in fact can be considered a paradigm shift. In addition, the notion that infrastructural works are increasingly confronted with delays related to unfounded environmental criteria and complex permitting procedures, combined with the expectation that in the (near) future more if not all projects will be developed along the principles of Building with Nature, triggered the setup of the Building with Nature innovation programme that started in 2008.

The Building with Nature programme, running for a period of five years, has a budget of 28 M EU, 50% of which is provided by the Dutch government and 50% is provided by a broad consortium of dredging contractors, consultants, knowledge institutes and universities. The Building with Nature innovation programme aims to discover and develop all the know-how and expertise required to realise the above described paradigm shift to go from Building ***in*** Nature (a reactive approach focused on minimizing potential environmental impacts) to Building ***with*** Nature (a proactive approach focused on making optimal use of natural processes and providing new opportunities for nature development). Pioneering work on this matter has been done by Dr.

Ronald Waterman (Waterman, 2008). Similar objectives are found in the Working with Nature initiative developed by PIANC, that acknowledges that the introduction of this type of concepts requires a shift in thinking and actively promotes to do so.

One of the key activities within the Building with Nature innovation programme is the development of a guideline for Eco-dynamic Development & Design. This guideline will be focussed on implementation of the Building with Nature principles throughout all of the stages of marine infrastructure projects (initiation, planning & design, construction, operation & maintenance). Its guidance is based on knowledge and experience from within the building with nature innovation program as well as external sources. While a small group provides the main structure of the guideline, all participants in the building with nature program are required to contribute. To facilitate this collaborative writing effort, and to provide users with instant feedback on their and other user's contributions, use is made of web-environment very similar to that of wikipedia.

2 THE OBJECTIVES OF THE ECO-DYNAMIC DEVELOPMENT & DESIGN GUIDELINE

As outlined in the previous section Building with Nature has been deliberately set up as an innovation programme. This means that the main objective is not the development of new knowledge as such, rather it is to induce the paradigm shift from Building ***in*** Nature to Building ***with*** Nature by developing required expertise, knowledge, tools and guidelines. This implies a strong focus on application and communication. Literature shows, that the challenge to get useful and effective results from innovation programmes is not a trivial one (a.o. EU, 1999; Mulder et al., 2001; Van Koningsveld, 2003; Davidson et al, 2007). Van Koningsveld et al. (2003) typed this kind of programme as 'driven research'; indicating that both specialists and users of specialist knowledge hold a stake in the content of the research (see Figure 1).

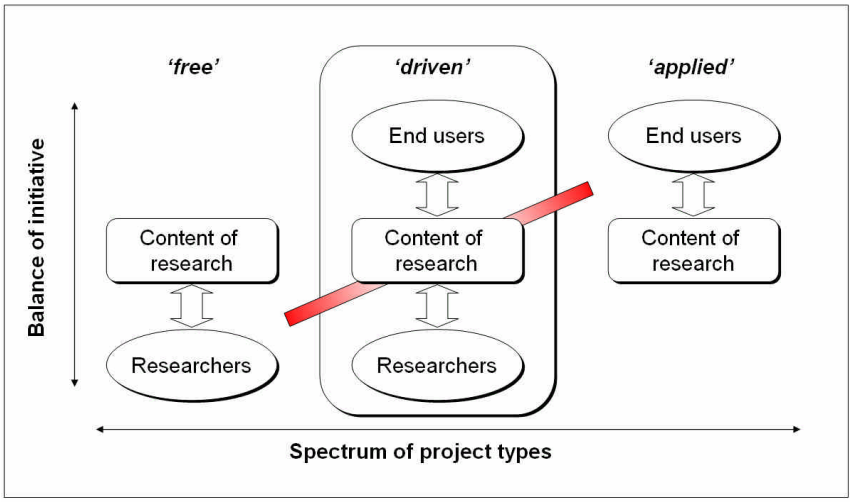

Figure 1. Spectrum of project types (Van Koningsveld et al, 2003)

Researchers and end users often have a fundamentally different perception on what is considered to be useful knowledge. Van Koningsveld et al (2003) analysed the lifecycle of 13 'driven research' projects and illustrated the potential development of an increasing gap between drivers and users of knowledge and developers of knowledge (see Figure 2 – upper panel). There are many examples available of research reports that remain unused, or even unread, and research outputs that in the perception of researchers provide an answer to the question, but that the end user is unable to use or recognise as a solution to his/her problem. This gap between specialists and users of specialist knowledge is often described as a 'knowledge gap' or a 'communication gap' and a commonly suggested way to bridge this gap is through 'improved communication' (e.g. EU, 1999; and Capobianco, 1999). But what exactly is to be improved? Van Koningsveld et al (2003) show that the gap may in fact best be characterised as a 'relevance gap' and we should improve the communication on what is 'relevant information', 'relevant knowledge'. Of course, the relevance of information and knowledge is a matter of perception. Not all knowledge that is scientifically relevant (long term), is also practically relevant (short term). To collectively decide on the focus of an innovation programme requires a lot of communication and information sharing (see Figure 2 – lower panel).

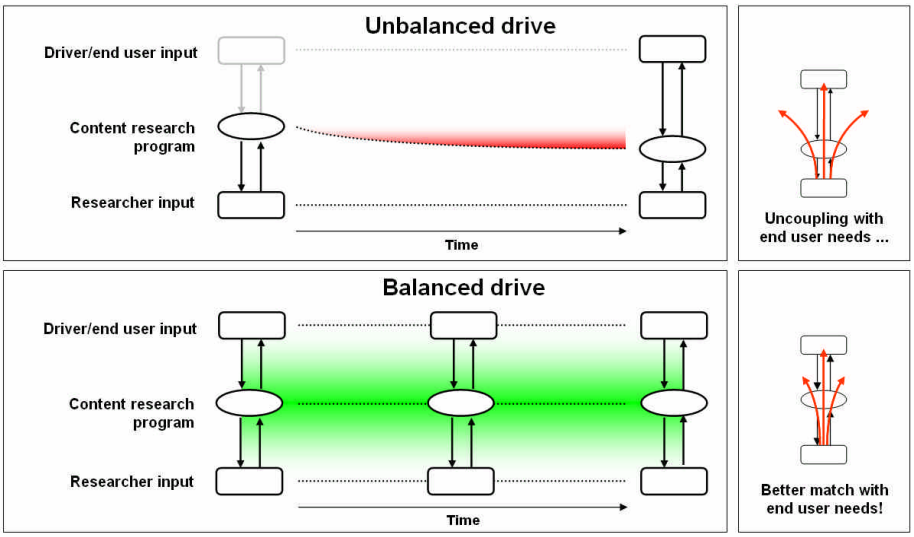

Figure 2. Potential for diverging perceptions when internal project communication is not properly organised (Van Koningsveld et al, 2003)

The Building with Nature programme realised the above difficulty and employed various techniques to maintain a proper focus throughout the programme:

- **Clear definition of programme objectives:** Early in the programme specific programme objectives have been identified against which the projects outcomes are regularly evaluated.
- **Focus through practical cases:** To ensure a proper focus on applicability of results, the programme has been organised around a number of real life practical cases.
- **Active involvement of end users:** The end users of the programme output (dredging companies, consultants, governments) are actively involved in the programme where they actively challenge to programme participants to translate their findings into lessons learned and practical guidelines
- **Translation to practice using Frame of Reference approach:** The research in the programme is organised with a strong emphasis on the usability of results, following the philosophy of matching research with end user needs (Van Koningsveld et al., 2003). For example, all PhDs involved in the programme are challenged to formulate the outcome op their research in terms of the basic frame of reference as proposed by Van Koningsveld and Mulder (2004).
- **Joint databases for data, models and tools conform OpenEarth standards:** All historic and case related data, models and tools are stored and disseminated in a similar manner according to the OpenEarth principles (Van Koningsveld et al., 2010)
- **Guideline for Eco-dynamic Development and Design as end product:** To maintain a strong focus on applicability and enable efficient transfer of lessons learned the programme decided to develop as its main deliverable a Guideline for Eco-dynamic Development and Design.

This paper is focused on the final bullet of the list above, viz. the Guideline for Eco-dynamic Development and Design. Development of this Guideline was the responsibility of the Eco-dynamic Development and Design or EDD workpackage of the programme.

An important first decision for the EDD team was to decide on the target reader group. It was decided that the guidance in the EDD guideline would be specifically targeted to the following reader groups:

- **Primary reader group:** Project owners / Proponents, Ecologists, Engineers, Consultants, Wet Infrastructure Contractors, all with a stake or responsibility in project design processes
- **Secondary reader group:** Authorities, Policy Makers, Politicians, Administrators, Standards Institutes, NGO's and Financers; these can potentially influence the design criteria and thus the challenges posed to the primary reader group.

This selection of reader groups was inspired by the idea that people with a design responsibility, the primary reader group, are in the best position to introduce Building with Nature alternatives. The Guideline should facilitate them in developing and designing such alternatives. The people that influence design criteria and other boundary conditions, the secondary reader group, are essential in lowering the threshold for implementation of these alternatives. Both groups are equally important in the realization process of Building with Nature projects.
A second, equally important decision, was related to the form in which the Guideline was to be delivered. As the Guideline was intended to provide focus within and throughout the Building with Nature innovation

programme, it was decided that a form should be selected that allowed people from the entire programme to contribute easily. A key quality would have to be that contributions were already delivered, evaluated and elaborated on during the project rather than at the end of the project only. A useful form to realize this was to adopt a wiki based approach. The EDD team took it upon itself to create a wiki based framework for the Guideline with templates to structure the contributions from the programme. In the periodic progress reports that each work-package of the programme had to provide a section to indicate what contributions were made (or planned) to the wiki. With these measures delivery of information to the wiki already during the programme was ensured.

Once the Building with Nature programme had gone through its start-up phase the work by the EDD team really got up to speed in the first months of 2010. To facilitate the delivery of contributions from the programme to the wiki the EDD team developed a first prototype outline to make clear what kind of guidance was envisaged. This first prototype outline was presented and discussed in various meetings and modified according to suggestions and feedback received from the programme. An important design challenge was related to the way a guideline user would be led through the Eco-dynamic Development and Design process. As a consequence of the diverse backgrounds of the Building with Nature partners a number of different preferences were expressed. Participants with a background in ecology preferred to take the natural system as a starting point resulting in a Guideline structure along various types of environments. Participants with a background in consultancy or contracting preferred a Guideline structured along the various phases of project realisation.

A structure purely along environments was considered to be less suitable as the Building with Nature project was certainly not complete in terms of the environments it covered. This meant it would be difficult to provide generic guidelines. A structure primarily along the phases of project realisation would not face this problem as in general terms these phases are applicable world wide. It was decided to start the guideline with as backbone the phases of project realization: initiation, planning & design, construction and operation & maintenance. This helps to come up with guidance that could be applicable also in environments not specifically addressed by the Building with Nature project. Next to generic guidance on Eco-dynamic Development and Design the Guideline contains an introductory chapter introducing the reader into the Building with Nature philosophy, a chapter containing a list of example cases, a chapter describing useful tools and a chapter containing so-named knowledge pages. With this structure implemented in the wiki the cases of the Building with Nature programme now starts generating and delivering information. Although the wiki based guideline is in a constant state of development its structure currently (mid may 2011) is considered stable enough to describe. The next section provides an overview of the current state of the wiki based guideline.

3 OVERVIEW OF CURRENT STATE AND FIVE EDD STEPS

Figure 3 shows a snapshot (05-05-2011) of the introduction chapter of the wiki based Guideline for Eco-dynamic Development and Design (see http://wiki.ecoshape.nl). The chapter describes the Building with Nature philosophy, the three principles for Eco-dynamic Development and Design and the five steps involved in generating EDD alternatives. These five steps are supposed to be generically applicable, although from project phase to project phase different aspects may be emphasised. Before we address the five EDD steps in more detail, first some important elements of the wiki page shown in Figure 3 deserve additional attention.

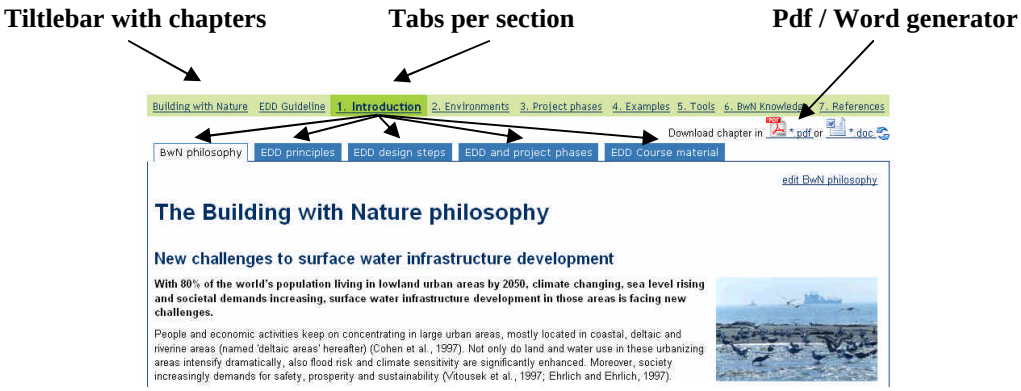

Figure 3. Important elements in the wiki setup of the Guideline (snapshot taken 05-05-2011)

Throughout the wiki based Guideline a header bar is included to facilitate easy navigation. The header bar basically contains the 'chapters' of the Guideline:

1. **Introduction.** Outline of the Building with Nature philosophy, the EDD principles and the five steps for Eco-dynamic Development and Design.
2. **Environments.** Approach to the guidance in the manual via the main environments represented by the BwN cases. It is recognised that this outline of environments is not comprehensive.
3. **Project phases.** Approach to the guidance in the manual via the various phases in the project realisation process. This approach provides a more generic guidance as it may be applied to projects in all kinds of environments world wide.
4. **Examples.** A catalogue of various types of example cases: eco-dynamic design cases, other cases (elaborate) and other cases brief.
5. **Tools.** A catalogue of various tools that could be of use in the Eco-dynamic design process.
6. **BwN Knowledge.** A collection of dedicated pages describing relevant background knowledge for EDD. The content is for a large part based on new knowledge actually developed within the Building with Nature programme.
7. **References.** A catalogue of all kind of reference material that was either used in the guideline or is interesting as material for further reading.

Within each 'chapter' the 'sections' are subdivided in tabs. The benefit of using tabs is that the amount of information per tab is relatively limited. To facilitate users that want to read a chapter as one (easily printed) document the EDD team developed the option to generate either a Pdf or a Word document with one simple mouse click. The information in each of the tabs is then placed back to back in one easily printable and portable document (including a timestamp to provide information for version control).

In the Guideline's current state the project realisation process is one of the most practical ways to provide concrete guidance. Project development, though being a cyclic process rather than a linear one, generally goes through a number of phases: 'initiation', 'planning & design', 'construction' and 'operation & maintenance', upto 'end of life' (see Figure 4). Depending on project management and contracting formats two or more phases might be merged into one.

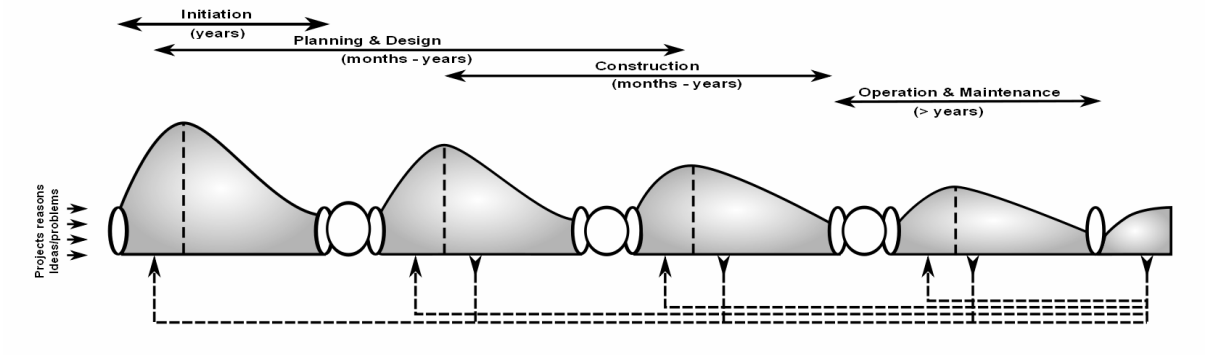

Figure 4. Project phases

During each phase opportunities for integration of EDD solutions do exist, with maximum BwN potential and flexibility in the earliest stages of development. To optimally 'seize opportunities', a life-time analysis is encouraged, considering information on EDD potentials from later phases in earlier phases. In Figure 4, the potential to integrate EDD solutions in each phase of the design is signified by the shaded humps.

A person with design responsibility and the ambition to introduce EDD solutions into a project is thus encouraged to carefully consider which phase the project he/she works on is in and stimulated to enter appropriate EDD solutions into the process. The job of the Eco-dynamic Developer or Designer is thus to generate more green and sustainable alternatives, valuate and select the most promising alternative or combination of alternatives and ensure that this alternative is included in the project realisation process. Analysis of practical cases has revealed that five steps are invariably taken when developing creative Eco-dynamic Developments or Designs. The steps together outline a basic creative process that can be followed in any phase of the project realization process. Figure 5 outlines the basic steps that have been identified by the Building with Nature innovation programme.

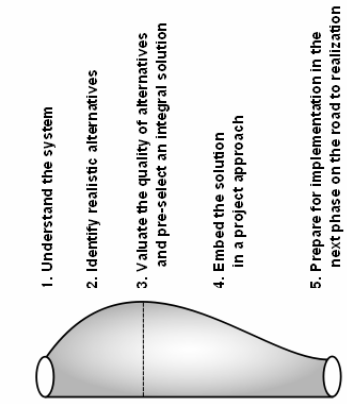

Figure 5. Five steps for Eco-dynamic Development and Design

The following brief suggestions per step have been extracted from the Guideline (snapshot 05-05-2011) to illustrate the lessons learned that have been gathered so far from analyses of historic cases.

Step 1. Understand the system (physical, socio-economical and governance)
Acquire a better understanding of the system in which a project is planned. In depth knowledge of the physical system (biotic as well as a-biotic), the socio-economic system as well as the governance context is crucial to identify potential win-win solutions.

- **Your system is determined by your objectives:** Be clear about your primary objectives and realise that finding win-win solutions creates room for flexibility in catering for secondary objectives. Your primary objective leads to a limited definition of the relevant system to consider. Adding secondary objectives forces consideration of other system characteristics, other parameters, other time and spatial scales etc.
- **Information about your system can be derived from various sources:** It is important to realise is that acquiring knowledge about a system is not a pre-requisite of scientists. Valuable information can be found everywhere!
    - Don't be afraid to talk to people with local knowledge (fishermen, harbourmasters, waiters, etc)
    - Don't be afraid to dive into historical records to better understand the evolution of the system as a whole and to think of approaches that build on historically available expertise
- **Think transdisciplinary:** Remember to look at potential user functions that lie outside the primary objective for which a project is initiated.

Step 2. Identify realistic alternatives
Identify realistic alternatives that provide true win-win solutions providing services beyond mitigation and compensation maximising system potential (physical, socio-economical and governance) while safeguarding sustainability.

- **Eco-dynamic Designs use an inverted methodology:** The most exciting Eco-dynamic Designs involve real eye-openers. Reverse a traditional reactive point of view into an exciting proactive point of view (problems are opportunities). One way to come up with such innovative 'reversing' ideas is to answer a number of basic questions:
    - ***Providing services to the ecosystem:*** How can we strengthen the functioning of the receiving system - ecology, recreation, landscape?
        - Larger scale: how can a project deliver benefits to the overall system in which it resides?
        - Smaller scale: how can the project (with small adaptations) be more eco-friendly to local flora and fauna?
    - ***Utilizing services provided by the ecosystem:*** How can better use be made of locally active (natural) resources: tide, waves, gradients, sediment availability, flora, fauna, economy, cultural values, etc?
        - Can available resources be utilized to lower construction and maintenance cost (more flexible solutions)?

        - Can available resources be utilized to come to more sustainable solutions (PPP solutions: less energy, less material, multi functional)?
        - Can system dynamics be used as a positive rather than a negative aspect (use expected change as an opportunity to achieve objectives, use available time to achieve necessary change gradually rather than at once with associated over-engineering)?
- **Solutions are of transdisciplinary character from the get go:** Bring together academic experts, field practitioners, community members, business owners, decision makers and other stakeholders to formulate alternatives.
    - Involve relevant other disciplines in the design process as soon as possible (which disciplines should collaborate given the system at hand, how should they collaborate in order to be most innovative/effective)
    - Look for an open minded rationality that is open for the unknown, the unexpected and the unforeseeable while rejecting dogmatism, ideology and intolerance (see also Wikipedia: Transdisciplinary studies).

Step 3. Valuate the qualities of alternatives and pre-select an integral solution
Assess the inherent qualities of the alternatives and combine them into one optimal integral solution. Valuate the EDD alternatives against a traditional design.

- **More value does not imply higher construction cost:** When you look for win-win situations often small adjustments can be made to existing designs in order to produce more value for less or equal money.
    - More for less is possible! Try to get great value gain with little investment.
- **Daring use must be made of creativity:** Don't be afraid to embrace innovative ideas. Dare to try and show it in practical examples!
    - Tell the story of implementation of creativity!
- **Uncertainties must be identified and handled:** Building with Nature solutions by definition involve dynamics and inherent uncertainties. Handling these uncertainties is a normal part of the Eco-dynamic Design process.
    - Remember that although a solution as a whole may be innovative, its components may be based on traditional know how.
- **Involve stakeholders in the valuation and selection process:** From Negative to Positive, from NIMBY (not in my back yard) to PIMBY (please in my backyard)!
- **Perform a cost-benefit analysis:** Take into consideration construction costs, maintenance costs as well as benefits for primary and secondary objectives. Compare the new solution with a traditional non-BwN solution (usually single objective).

Step 4. Embed the solution in a project approach.
Embed the integral solution in a project context considering practical restrictions and governance context.

- **Consider the conditions/restrictions provided by the project:** Make sure that an innovative idea is optimized so that it may actually be constructed.
    - Take execution aspects into account (workmethods, availability of equipment, etc)
    - Identify important timing aspects (growing seasons, closed seasons, time for ecological components to evolve to desired state, etc.)
    - Help the project to tell the story. If you have proceeded to implement an innovative idea make sure that you tell your story to the project team, the stakeholders and the public. Think of access routes to a project, guided excursions, information panels, press releases etc.
- **Implementation of solutions requires involvement of entire network:** networks and connections need to be established between all organizations involved
    - Effectively involve stakeholders in the design and realisation process
    - Use existing examples that people can use as inspiration, as building blocks for future projects. Solutions should be of an 'open source' nature. In networks ideas should/can not be protected. They should be open for use by others. Share costs, expertise and ideas. Don't be possessive.

Step 5. Prepare the solution for implementation in the next phase on the road to realization
Handle the practical bottlenecks to get the solution included in the next phase on the road to realisation: inclusion in request for proposals, inclusion in the detailed design, inclusion in the project delivery, inclusion in maintenance and monitoring scheme.

- **Translate solution to a technical design:** What would you need to actually implement the proposed solution (lacking knowledge, available materials, sustainability criteria etc.).
- **Translate solution to request for proposals or contract:** How to reformulate the request for proposals (TOR) so that the innovative solution will be proposed or constructed.
- **Organise required funding:** Try to involve stakeholders in the search for additional funding if required.
- **Identify permitting requirements:** Identify as soon as possible potential bottlenecks in terms of permitting and organise necessary input (required knowledge, required support by stakeholders).
- **Prepare risk analysis and contingency plans:** Building with Nature is dynamic almost by definition. Make sure the project takes this aspect into consideration (adaptive execution, adaptive management)

The above described five steps have been integrated in a course to develop conceptual Eco-dynamic Developments and Designs. The course material has been used in various trainings and workshops such as the Eco-dynamic Design Challenge from the Hogeschool Zeeland in Vlissingen, the Netherlands, the Post Academic Training Course on Building with Nature organised in Delft, the Netherlands and the Eco-design workshop organised in Singapore. It was demonstrated that the guideline and the provided course material could easily be used in practice.

Even though the BwN programme is not finished yet one may appreciate that a lot of results have already made their way into the Guideline. In the coming months towards the end of the BwN programme the EDD team will select pieces of the manual it wishes to release to the general public. To do this properly each part of the Guideline will undergo a number of internal and external review steps. By means of this review process the EDD team believes that the quality of the Guideline's content as a whole can be guaranteed. Following this procedure the entire wiki based Guideline will batch-wise be released to the stakeholders and to the general public.

4 DISCUSSION AND CONCLUSIONS

This paper described the development of a Guideline for Eco-dynamic Development and Design, one of the key activities within the Building with Nature innovation programme.

It was shown how the Guideline, besides being an important deliverable, also is a means to an end in creating and maintaining a proper balance between scientific interest and practical needs. The selected wiki based approach fulfilled (and in fact still is fulfilling) the promise of being an interactive environment where people from the entire programme gravitate towards to deliver their findings and lessons learned. They do so not only at the end of but rather already during the innovation programme.

Several factors have supported the successful integration of this wiki based approach into the programme. Besides of course the presence of an active EDD team, who are continuously reviewing all contributions and effectuating structural changes to the wiki swiftly if needed, also the top down support from the programmes management team and programming board were essential to generate a project wide support for the approach and ensure its effective implementation.

This paper furthermore showed the current structure of the wiki based guideline (snapshot 05-05-2011) and introduced the reader to the five steps of Eco-dynamic Development and Design as they have currently been written down in the Guideline. Some applications of the current Guideline have been discussed and an outline of planned future work was given.

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