

How can citizen science empower citizens and civil society?

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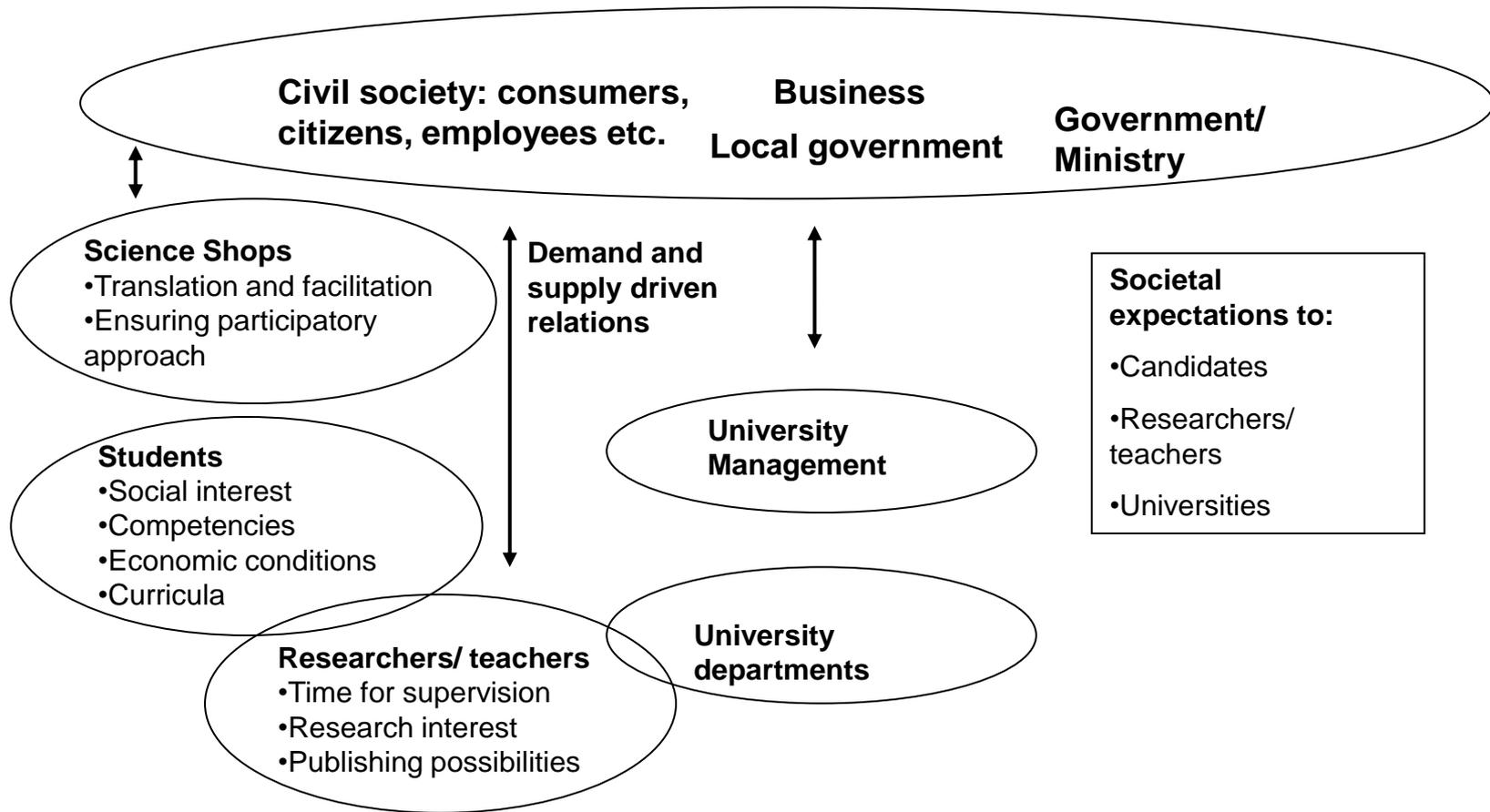
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Overview

- Examples of citizen science and science shops
- Integration of citizen science into policy making
- Design of spaces for university-civil society collaboration
- Hackley: Citizen science and policy: A European perspective
- Experiences from Living Knowledge – international network of science shops
- Voorberg et al: A Systematic Review of Co-creation and Co-production: Embarking on the social innovation journey

Science shop: a formalised open door to the university for civil society

– as part of the university-society relations



Overall types of civil society needs in requests to Science Shops

- Documentation of problems already perceived by CSOs – in order to obtain acceptance from other stakeholders, like government and businesses (e.g. different types of pollution)
- Development of new knowledge about a concern CSOs have (a new technology area and its possible paths and impacts)
- Development of design proposals supporting implementation of a preventive CSO strategy (urban ecology, organic food)

Levels of citizen participation in citizen science

- *Passive sensing*: participants use available sensors (e.g., in smartphones)
- *Volunteer computing*: participants donate the unused processing power of their computers and devices
- *Volunteer thinking*: participants engage in cognitive tasks to assist scientists
- *Civic/community science*: Active engagement in building and deploying scientific tools and methods

Citizen science at different scales

- The local geographical scale most familiar to people: streets, squares, and backyard of their homes
- Location of daily activities, and therefore suitable for short observations and activities that can be integrated with other routines
- Local issues: a source of community action and a way for people to come together addressing collective concerns
- Regional, national and international research demands more coordination and translation: comparison and explanation



Participant samples dust from a bus stop at Pepys Estate, London (Photo Credit: Mapping for Change)

Capacity building in CSOs: Enhancing the capacity for changing society

- CSOs provided with knowledgeand are (maybe) able to implement results in their activities or services
- CSOs bring forward the scientific research and its results in order to raise interest and support around a topic.
 - Although a scientific report might not be enough to convince other stakeholders
- CSOs learn to apply scientific methods or theories (e.g. sampling, focus group interviews, etc.)

The knowledge production in community-based research – shaped by the participants and the context

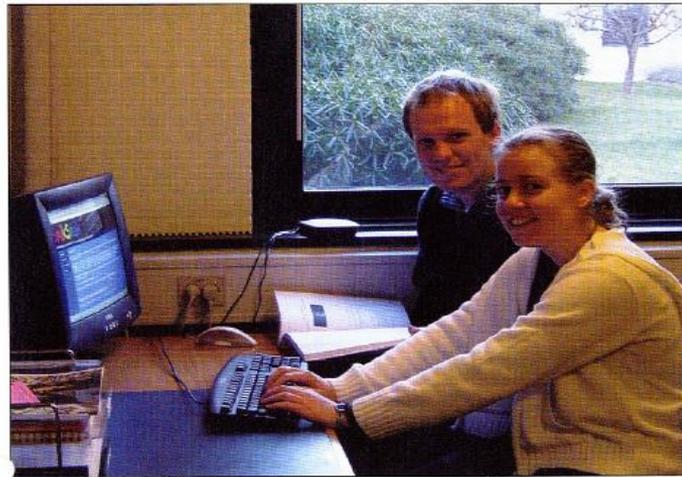
- *Interactive knowledge production* between students/researchers, the Science Shop and the CSO
 - *the speaking difficulty and the urban planning project*
- *Knowledge supply*, where researchers or students produce new knowledge, which is transferred to the CSO
 - *the health and traffic project and the polluted pond project (focus on the independency of the research)*

Impact: Students develop game computer programme and it is made available at web site

Need for better tools for children with speaking difficulties

- experienced by pedagogic staff

- Want to give the children possibilities to train themselves
- Kinder gardens visited as part of the development



SnikSnak

PC-spil til børn med talevanskeligheder udviklet som del af et spændende midtvejsprojekt via Videnskabsbutikken

At computerspil er sjovt, er der ingen tvivl om hos de fleste børn, men et computerspil udviklet som en del af et midtvejsprojekt på DTU kan også gøre livet lettere for talepædagogers arbejde med talevanskeligheder hos børn.

En del børn i Danmark har talevanskeligheder, og børnenes problemer er meget individuelle. Et eksempel kan være, at et barn ikke kan sige 's'-lyde og derfor siger "dommerfugl" i stedet for sommerfugl".

Børnene undervises af talepædagoger, enten i kommunalt eller amtligt regi



Et skærmbillede fra spillet, hvor børnene opfordres til at tale så meget som muligt.

mærken af ord, lyde og billeder. Målet

- At projektet er blevet til i samarbejde med Videnskabsbutikken på DTU har givet os mulighed for at lave et program, der reelt er behov for, og det har været en stor motivationsfaktor, fortæller to af de studerende, Tine og Jacob.

Efter hvert endt spil kommer den såkaldte Pauseklavn, hvilket er en animationssekvens med musik og tale, hvor barnet opfordres til at rejse sig og bevæge sig. Dette er indført på opfordring af flere talepædagoger for at skabe variationer, der bibeholder børnenes koncentration.

Projektet har givet os mulighed for at anvende teori og teknikker fra mange forskellige grene af softwareudvikling. Vi har konstrueret et stykke software fra bunden, hvilket har involveret en mængde analysearbejde af problemet, design af hvordan programmet skal se ud og en grundig test af det endelige program, både tekniske test og brugervenligheds-test. Vi har derudover også beskæftiget os med problemer vedrørende distribution, installation, licenser og rettigheder for at opnå et brugbart produkt.

Brugervenlighed i højsædet

Brugervenlighed har været en central del af projektet, da programmet skal kunne anvendes af brugere med meget forskellig computererfaring og af både voksne og børn.

For at sikre dette har vi benyttet os interaktionsdesign-teknikker og arbejdet med menneske-computer interaktion har især givet sig til udtryk ved involveret slutbrugere gennem ieklet såkaldt 'participatory'

Impact: Students help local community council visualise their ideas about new public facilities as part of urban renewal on empty spaces.

Led to new culture house. The Copenhagen city administration started taking the local council serious.

=> part of city experiment with local planning

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BYPLANLÆGNING TORE PLOUGHED

Lokalplanlægning fra DTU giver øget borgerindflydelse

Studerende har lavet byplanlægning i Vanløse til gavn for borgerne

„De studendes lokalplan er en hel lille Bibel for os. Den har i høj grad været med til at give Vanløses borgere en forstærket indflydelse på lokalplanlægningen i en tid, hvor vi diskuterer hvordan bymidten kan fornyes samtidig med at Vanløses provinspræg bevares.“

Ordene kommer fra Erik Honoré, formand for Vanløse Grundejersammenslutning. Han har de seneste år sammen med sin forening via Videnskabsbutikken på DTU fået hjælp og nye idéer fra studerende på DTU til at udvikle små og store projekter som led i en ny, samlet lokalplan for centrum af Vanløse, der skal gøre hele bymidten mere levende og attraktiv, men samtidig bevare Vanløses særpræg.

En række industrigrunde omlægges i disse år fra erhverv til boliger, parkeringspladser og nye uddannelsesarealer, og nye faciliteter til unge iværksættere og væresteder for idræts-

udøvere af alle slags står også højt på ønskelisten. Så langt står et nyt kulturhus færdigt, og to byggegrunde er tilbage. Og grundejerformanden i Vanløse er særdeles tilfreds med de foreløbige resultater:

Samarbejde gav gode værktøjer

„Som grundejere og borgere vil vi selvfølgelig gerne være med til at sætte et fingeraftryk på udviklingen i området. Men det er ofte svært at blive taget alvorligt af kommunen, fordi vi, der repræsenterer borgerne, ikke er eksperter, og der derfor godt kan komme temmelig luftige påstande og idéer frem. Men netop samarbejdet med de studerende på DTU har givet os nogle rigtig gode værktøjer til at håndtere byplanlægningen, og vi har næsten allerede nået mere, end vi drømte om.“

Erik Honoré nævner det nye kulturhus som et konkret eksempel på et projekt, der blev udarbejdet af DTUs studerende på baggrund af borgernes ønsker, læret videre fra borgerne til politikerne og til sidst realiseret til et færdigt hus. Et nyt helsecenter, der skal samle en række læge- og sundhedsfunktioner under et tag, på forslag fra DTU-studerende, er også blevet særdeles godt modtaget blandt de adspurgte borgere, fortæller Erik Honoré.

„Der vil altid være en svær balancegang mellem en byherre, der skal tjene penge på sine projekter og så borgerne, der har en masse idéer til, hvordan man kan udnytte de forskellige arealer og bygninger. Men alene det, at DTUs lokalplansforslag har været med til at skabe diskussioner blandt borgerne selv og givet dem medindflydelse har været rigtig godt.“

I det hele taget har borgerne været inddraget meget og er blevet spurgt i større og mindre

undersøgelser i forbindelse med udarbejdelsen af de alternative lokalplaner. DTUs seneste rapport blev også offentliggjort i lokalpressen og gav anledning til mange gode diskussioner om fremtidens udformning af Vanløse centrum.

Realistisk midtvejsprojekt

Marie Sellebjerg Møller, Vibe Gry Nielsen og Mette Frølund, der alle studerer polyteknik på DTU står bag den seneste lokalplan. Den blev udarbejdet over et helt semester, fra februar til juni 2005.

„Vi ville gerne lave et realistisk midtvejsprojekt, der involverede rigtige mennesker. Derfor var det spændende at deltage,“ fortæller Marie Sellebjerg Møller, der for nylig besøgte Vanløse for at se, hvad der var sket.

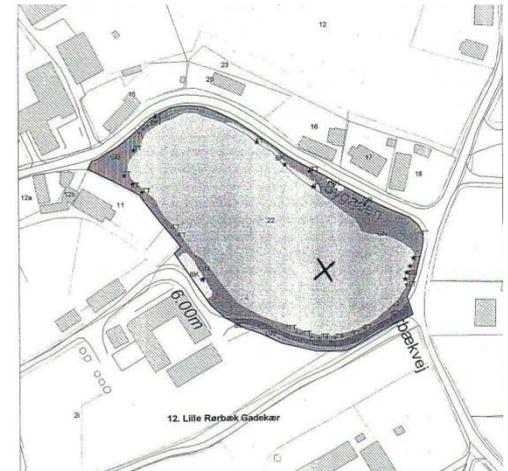
„Jeg blev meget overrasket over, at der sket så meget. Det ser helt klart ud som om,



Impact: NGOs bring forward the scientific research and its results in order to raise interest and support around a topic

Polluted pond

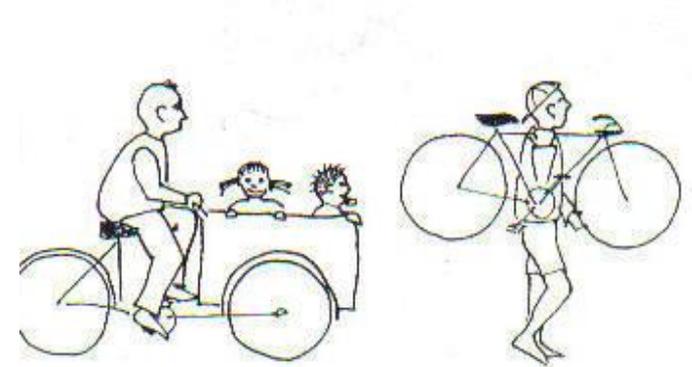
- Initiated by a local branch of the Danish Society for Nature Conservation
- Municipal government did not recognise problem
- The Science Shop documented the problem and came up with solutions
- The municipality chose not to rehabilitate the pond despite scientific evidence of pollution level
- NGO did not involve the local press
- The environment in the pond were not prioritised
- *Would a more dialogue-based approach with the municipal government about the problem have given influence on the policy priorities?*



Impact: NGOs learn to apply scientific methods or theories used by the researchers or the students (focus group interviews)

Obstacles to city bicycling - initiated by the Danish Cyclist Federation (DCF)

- Intention: a project documenting bicyclists' environmental awareness and fear of cars and busses
- Science Shop project highlighted new barriers experienced by the bicyclists: Fear of other bicyclists important
- DCF used existing networks and occasions to apply the new insight
 - Project together with a municipality about cycling conditions included a focus on bicyclist behaviour
- DCF able to use focus group interviews as a methodology in other situations inspired by the methodology in Science Shop project



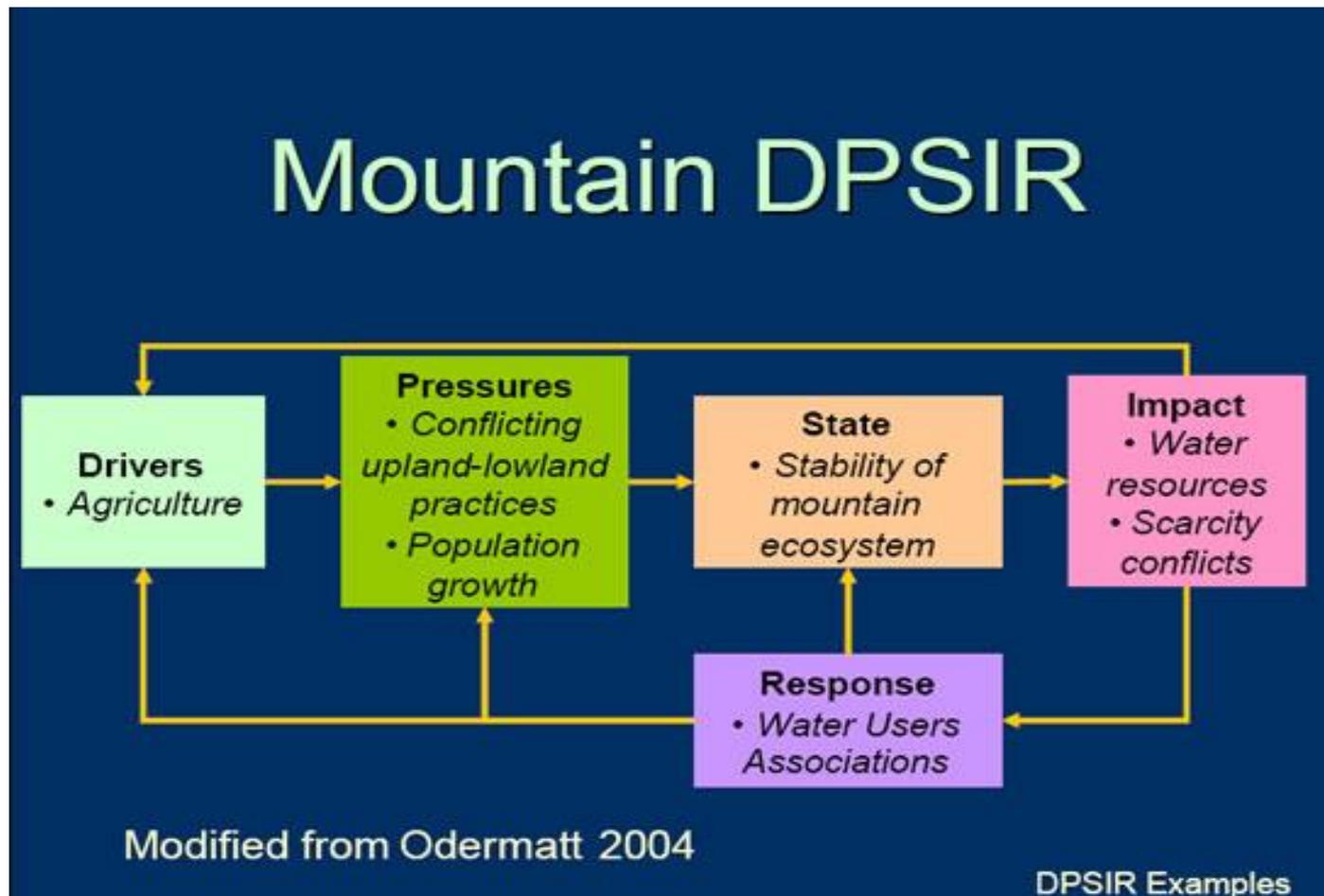
Examples of 'big data' citizen science

- Zooniverse project: Over one million people participated in
 - classifying images of galaxies,
 - listening to bat calls,
 - transcribing World War I diaries,
 - identifying animals in the Serengeti
- Germany: Scientists collaborated with 5000 people to capture over 17,000 samples of mosquito, resulting in the discovery of an invasive species with implications to public health
- UK: Team of climate researchers wanting to suggest the degree to which recent floods could be attributed to climate change
 - Able to run over 33,000 models using the unused computing resources of over 60,000 volunteers

Integration of citizen science into policy making

- Citizen science activities should receive funding taking longevity of start-up time into account and allocating long-term funding to support sustainability
- Interaction with knowledge-based institutions like universities and private and public research institutions critical to success of citizen science
- Requires raising awareness and providing incentives to such organizations to be involved in citizen science
- Targeted efforts in establishing mechanisms like Science Shops to encourage greater interaction with civil society
- Citizen science can yield high quality data => requires an understanding both at the level of the project and by end-users of the information
- Appropriate guidelines and information needed to facilitate use and interpretation of citizen science data

Citizen science applicable in all stages of the DPSIR model



Model for analysis of Science Shop projects with CSO's

<p>The social context of the problem:</p>	<ul style="list-style-type: none">• The knowledge need of the CSO• The strategy of the CSO in approaching the Science Shop• The aim of the project co-operation
<p>The co-operation process:</p>	<ul style="list-style-type: none">•The shaping of the project co-operation (aim, methodology etc.)•The knowledge production (interaction among the involved actors)
<p>The results, outcome and impact of the project:</p>	<ul style="list-style-type: none">• The strategy of the CSO and the other project partners for application of the results to fulfil the aim

Strategies for research development from Science Shops

- Science shops as antenna about new problems and needs
 - *Medicine and pregnancy (Groningen, The Netherlands)*
- Science shop as incubator for new research area
 - *Organic food as new research area at DTU, Denmark*
- Research departments take up participatory research methods through interaction with science shop
 - *Medicine Science Shop, Groningen, NL*

Science Shop as incubator: *The embedding of organic food production as research area at DTU*

Period	Development in societal discourse related to organic food production	The activities of the Science Shop and the affiliated community research centre	The interest of the 'established' researchers at the university
1985-1990	<ul style="list-style-type: none"> •Organic agriculture starts growing on the initiative of city people moving into the countryside 	<ul style="list-style-type: none"> •The Science Shop receives questions from agriculture organisations •Projects done as student projects 	<ul style="list-style-type: none"> •Food and environmental researchers as supervisors on Science Shop projects
1990-1998	<ul style="list-style-type: none"> •Organic agriculture increases due to problems with pesticides in ground water •Conventional farmers converts to organic farming in bigger numbers 	<ul style="list-style-type: none"> •Apply for funding from national organic food research programme ⇒ Science Shop develops own research group 	<ul style="list-style-type: none"> •Science Shop invited to give lectures at food technology course •Food researchers not interested in participating in research project on organic food processing
1998-	<ul style="list-style-type: none"> •Processed organic food products increase 	<ul style="list-style-type: none"> •Apply for funds from national food research programme •Suggests consumer organisation to plan research project on consumer policy 	<ul style="list-style-type: none"> •Food researchers agree to co-operate with organic food research group on project on care in organic food processing

Science shop as facilitator of new research area: *The embedding of re-use of rain water at DTU*

Period	Development in societal discourse related to green water management	The activities of the Science Shop and the affiliated community research centre	The interest of the 'established' researchers at the university
1985-1990	<ul style="list-style-type: none"> •Focus on low-tech wastewater treatment •Focus on reuse of rainwater 	<ul style="list-style-type: none"> •The Science Shop receives questions •Projects done by students 	<ul style="list-style-type: none"> •Teachers find Science Shop projects time saving and interesting
1990-	<ul style="list-style-type: none"> •Debate on the reuse of rainwater •Stakeholders participate in seminars •EPA starts projects on reuse of rainwater and local wastewater management 	<ul style="list-style-type: none"> •Science Shop decides to try to embed activities on 'green water management' •Proposes two departments to organise seminars in co-operation with the Science Shop 	<ul style="list-style-type: none"> •Teacher integrate topics in courses •Teacher proposes new project themes – from a more critical angle •Departments get national research funding