

Environmental Empowerment - the role of Co-operation between Civil Society, Universities and Science Shops

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Abstract

The University based Science Shops were established in the 1970s in the Netherlands, and in Denmark and other countries in the 1980s and 1990s. The aim was to give civil society organisations access to scientific knowledge and to empower citizen participation regarding environmental and social improvements.

It has recently been suggested that the role of Science Shops should change as a consequence of the stated increasing professionalisation of the Non Governmental Organisations and Civil Society Organisations, and of industry's increasing interest in introducing environmental management measures. Increasing internationalisation of the environmental agenda has contributed to this as well as a general acceptance of environmental considerations in industry policy and strategy.

However, with departure point in three different Science Shop projects, the article proposes that Science Shops are still important for empowering citizen through access to scientific knowledge by raising and documenting environmental issues, by assisting citizens with knowledge supporting environmental sustainable activities, and by potentially raising alternative scientific agendas and develop alternative technological solutions.

Thus, the article by underlining the role of science and Science Shops, address the debate on public understanding and participation in two ways: on the one hand by dissociating from the 'deficit thinking', in which citizens are regarded as lacking knowledge, and on the other hand by drawing attention to the importance of scientific and systematically argued knowledge as input in participatory processes.

Introduction

The paper analyses the role of co-operation between environmental civil society organisations (CSOs), -including Non-Governmental Organisations and more temporary Community-Based Organisations - and university-based Science Shops, in adapting to and influencing societal environmental agendas, and in developing new knowledge, new technology and policy initiatives. The article advocates for the assumed still important role of Science Shops as mediators in social, environmental and technological development and debate

The Science Shop movement started in the Netherlands in the 1970s, and other countries followed in the 1980s, Denmark being one of them. According to the EU commission (2001) (referred in Leydesdorff and Ward, 2005; Wachelder, 2003) there are over 60 Science Shops in Europe, hosted by universities or established as independent non-profit institutions.

The general idea with the concept of Science Shops was to enable CSOs to get access to scientific knowledge and advice in order to help them in their work for social and

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environmental improvements. Regarding the university-based Science Shops² they were further meant to act as open doors to the universities by enabling the CSOs to establish co-operation and networks with university researchers and students.

CSOs were invited to ask for having projects carried out for them for free by Science Shop staff, researchers and students. The students' projects would in return be made part of their university curriculum and of their exam, with a professor/associate professor or assistant professor as supervisor (Jørgensen, 2005; Mulder and de Bok, 2006).

The Science Shops thus in several ways have been part of the democratic and egalitarian movements of the 1960s and 1970s by empowering CSOs to contribute to and take part in political activities, debates and negotiations. This has been done by inviting to both access to and initiation of scientific projects, based on existing knowledge as well as producing new knowledge.

In Irwin, 2004, the Science Shops are referred to as having developed from a radical experiment in scientific democracy to a welcome vogue. They are, according to Irwin, well placed to respond to the new European objective of bringing science and society closer together.

The relation between science and citizens and everyday life, and the theoretical and empirical input, has been part of this, and is discussed by Irwin (Irwin, 1995). The schism of dealing with complex problems with theoretical assumptions and necessarily leaving out a number of issues on the one hand, and relying on some active lay groups' perception of the problems on the other. In this dilemma, Science Shops are regarded as a platform for bringing together the scientific analytical principles on the one hand, and the lay persons' knowledge on the issue on the other, and thus contribute with theoretically based systemization of lay knowledge or problem conception, and with lay insights and perceived problems to science.

Jamieson (2001), too, has engaged in the discussion about civil society and access and influence on scientific knowledge, paying special attention to environmental issues. According to Jamieson (2001) the role of the citizen groups has been to react to particular cases of environmental destruction by mobilising knowledge and expertise concerned with the strain on the environment and by developing alternative initiatives for environmental improvements. Jamieson (2001) however argues that local activism has been decreasing since the 1990s, moving the agenda of the professional organisations to more international problems and policy making rather than on local problems.

Despite the European Commissions positive attitudes to Science Shops as mediators between science and civil society, and despite of support for European projects to strengthen the Science Shop networks, some countries have been seen to cut back on resources for Science Shops. This has made some suggest that Science Shops may have out played their role or that they need to find new roles (Leydesdorff and Ward, 2005).

Contributing to this is that NGOs as Science Shop customers are increasingly employing their own scientists (Jamison, 2001). Science Shops may thereby be made less necessary as science mediators, compared to when Science Shops were established in the 1970s.

² Universities have, to a varying degree, supported the Science Shops, by e.g. offering office space and subsidising secretary-, student- and scientific- assistance.

Leydesdorff and Ward (2005), on the basis of the INTERACTS³ study from 2004, suggest a somewhat more pragmatic approach to the role of Science Shops under the changing societal conditions, and suggest that the survival of the Science Shops may be ensured by taking on new tasks. With the environmental agenda increasingly being part of company strategies, Leydesdorff and Ward (2005), see new perspectives for Science Shops as consultants for industry, maybe in separate constructions separating the commercial activities and the community activities.

We however suggest, based on the 12 environmental case studies of INTERACTS, that Science Shops still have an important role to play as mediators between community-based organisations and science. On the one hand as providers of scientific knowledge and access to scientific knowledge for community-based organisation and NGOs, on the other hand as providers of community organisations ideas and knowledge for science to incorporate into R&D and the development of constructive or alternative solutions.

These two roles should be seen in relation to two tendencies in environmental policy, which have characterised the environmental debate as well as policy, especially since the Brundtland report (1987), made for the Earth Summit in Rio de Janeiro in 1992:

- a) On the one hand an increasing professionalism of the national and international environmental NGOs and their participation in international negotiations, and
- b) on the other hand, an increasing number of local green initiatives within Local Agenda 21 groups with focus on "green" life styles and local environmental activities, contributing to the overall environmental agenda.

Thus, with departure point in the Danish examples in the INTERACTS study of Science Shops (Jørgensen et al, 2004; Brodersen & Jørgensen, 2003), we would like to emphasise what we see as the still important role of Science Shops' in raising concerns, as well as their role in the internationalisation of environmental issues, both on the concerned side and on the constructive side. That is Science Shops as promoters of community participation in the shaping of the alternative societal environmental discourse and in getting international environmental agendas work in practice.

In the following the three Danish case studies in the INTERACTS study of Science Shops are analysed, to demonstrate that Science Shops still plays an important role for the CSOs to get access to needed knowledge.

Methodology

3 environmental Science Shop projects⁴ were selected to demonstrate differences in the role of the projects, e.g. differences in the knowledge requests, the kind of knowledge produced, the methods used and the resulting actions. Two projects from the Science Shop at the Technical University of Denmark and one project from the Science Shop at the University of Roskilde, north and south of Copenhagen, respectively.

Semi-structured interviews were carried out with the students responsible for carrying out the project; the supervisor for the project, which in all three cases was an associate professor; CSO representatives; and Science Shop representatives.

³ An EU funded Science Shop project, aiming at investigating how to improve the interaction between NGOs, universities and Science Shops in Europe. The final outcome of the project can be read in: Jørgensen et al, 2004: *INTERACTS - Improving Interaction between NGO's, Universities and Science Shops: Experiences and Expectations*. The Danish cases can be read in Brodersen & Jørgensen, 2003: *The Danish National Case Study Report - Improving Interaction between NGO's, universities and Science Shops: Experiences and Expectations*.

⁴ A strong emphasis on environmental issues in societal critiques, especially in the 1980s, seems to have been reflected in the focus of the Science Shop projects, and has also influenced our choice of projects for this article.

An interview guide, focussing on information about the process and the way the projects developed as they progressed, was used: Could the projects be categorised from the beginning according to our understanding of a) local, national or international documentation projects, 2) projects initiated by the local utilization of international or national initiatives or 3) explorative interests in what strategies the CSO should follow. The open-ended questions enabled both the development of relevance to the particular case being studied and flexibility among the cases.

Questions were asked that focussed on the actors' role and their perception of the other actors' role in the co-operation. In order to understand the social shaping of the 3 co-operation processes, the analysis were structured in 3 overall themes:

The social context of the problem:	<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
The co-operation process:	<ul style="list-style-type: none"> - knowledge production (interaction among the involved actors) - the shaping of the project co-operation (aim, methodology etc.)
The results, outcome and impact of the project:	<ul style="list-style-type: none"> - strategy of the CSO to apply the project results/outcome in relation to persuading the aim

Cases

Case 1: Polluted ponds

The village pond project was initiated by a local branch of the Danish Society for Nature Conservation (DN Frederikssund). DN Frederikssund wanted documentation for the feared serious pollution state of the pond. The documentation was meant to be used in negotiation with the municipal authorities on potential preventive actions and rehabilitation.

The indications of the problem were that flora and fauna in the pond had been disappearing over the last 30 years. DN Frederikssund assumed this development to be a consequence of a leak in the sewerage system having drained the pond, as well as of sewage being led into the pond. DN Frederikssund therefore feared that the pond would become choked in few years, if action was not taken, but had had difficulties in getting through to the authorities and to the local politicians.

The project was carried out by 4 biology students from the Science Shop at Roskilde University Centre, RUC. The project was defined in co-operation between the students and DN Frederikssund, but from thereon co-operation between the students and the organisation was limited. The DN Frederikssund was satisfied with the set up of the research agenda because their priority was to get a scientific documentation of the pollution state of the pond and suggestions to how it could be rehabilitated, and the students' supervisor, did not want current, potentially politically motivated, alterations in the research design.

The students produced a report documenting the pollution level in the village pond and suggested a rehabilitation solution. The experimental work for the report was based on water samples that were analysed for a selected amount of parameters determining the water conditions. The results of the water samples were compared with the theoretical condition for equilibrium in lakes. On this basis, the students' recommended what they found was a suitable solution for rehabilitating the village pond. During the project the students informed the residents around the village pond about their research and why they were there. This led some of the residents

to offer boat capacity and other services to the students while they were doing their experimental work.

The report documented what the citizens and the DN Frederikssund feared were the causes for the poor state of the ponds, and as such increased the DN Frederikssund's standing in the negotiations with the municipality, both scientifically documenting their 'intuition' and suggesting feasible solutions to the problem.

The report and its recommendations were however only modestly used in the DN Frederikssund's negotiations with the municipality authorities and the municipality does not seem to have plans about acting on the report. Despite the documentation DN Frederikssund chose to keep a low profile and preserve their good relationship with the municipality, and thus not tried to mobilise the community against the municipality. The public debate has, despite paper articles on the issue, also been modest.

The village pond project can thus be seen as a traditional Science Shop project, letting civil society organisation's suspicions be the background for scientific research, by analysing intuitively and experience based knowledge more systematically. This case shows that knowledge does not in all cases lead to influence. Influence is shaped by the support and actor-constellations which are created around a certain topic, and in this case it was not possible for the organisation to create this actor-constellation with the local environmental administration, which would make the authorities prioritise rehabilitation of the village ponds in the municipality

Case 2: Construction of an earth igloo for vegetable storing

The project was initiated by the day care centre, Vognporten, in the Albertslund municipality west of Copenhagen. The day care centre wanted to introduce organic foods in the kitchen procedures, and experienced a need for re-thinking sustainable purchasing routines and storage possibilities, as a consequence of different delivery systems for organic products. From daily food delivery, organic food would be delivered once a week. The institution further needed an overview of the products of the season.

The motivation for the parents and staff in Vognporten to introduce organic food, was a wish to contribute to global sustainability by locally reducing pesticide and fertilizer use. The municipality had been rather active in introducing agenda 21 activities, so a fertile climate for the initiative was expected, though the municipality had not yet promoted activities of the kind.

The contact to the Science Shop at the Technical University of Denmark, DTU, was established via parents to some of the children in the day care centre and the project was defined in close dialogue between the two students carrying out the project, their supervisor, the Science Shop and the day care centre.

The close cooperation between the students, the staff and the group of parents of the day care centre continued throughout the whole project. Both the students, the staff and parents in the day care centre found it important to share knowledge and participate in producing the knowledge to ensure a system that could be integrated into the institutional life. This was done by discussing ideas and perspectives and by having the students making observations and taking part in the daily routines in the institution.

The project was defined as: To investigate the technical possibilities for storage either as earth igloos or other storage facilities. Further to develop a guide to the day care centre, specifying how to store the organic products with regard to humidity, temperature, and which products to store together and which to keep separated.

The students, based on a literature study, recommended two types of storage facilities: an earth igloo and an earth grave. The recommended earth igloo was found to be produced in Sweden already, and the day care centre manager, the kitchen assistant and the students went to Sweden to get more detailed knowledge about the igloo. The igloo suited the required demands to humidity, temperature and separation facilities and also matched the kitchen assistant's (and the Municipal Food Control Unit's) requests to hygiene by its construction in glass fibre making it easier to keep clean than the earth grave

On the background of the visit to Sweden, the manager, kitchen assistant and the students introduced the idea to the parents and staff, whom all backed up the idea of implementing the earth igloo.

The parents via the board in the day care centre then applied the municipality for funding. The municipality granted the funding. According to the day care centre, the students and the Science Shop, the decision to fund the project had been motivated amongst other by the thorough collaborative work between all the represented groups in the institution and the Science Shop, making the system of delivery and storage seem very favourable. But also the fact that the parents and the institution could back up their request with a scientific report, was argued as one of the reasons for the municipality to grant the earth igloo.

Some years later the system of applying organic food was spread to all institutions in the whole municipality, via amongst other joint activities between the Science Shop and the day care centre, and via the participation of the day care centre staff in a range of activities.

- Two pamphlets developed by the students were used by the municipality in promoting organic food in other institutions within the municipality.
- Lectures given by the leader and the kitchen assistant of Vognporten about the system and its implementation at Ecological Adult Education Association's courses.
- A video and three pamphlets developed by three other students through the Science Shop DTU and Vognporten about the development of the co-operation on the system and its diffusion to the whole of Albertslund municipality.
- Interviews given to the local newspaper on the experiences with the conversion to an all organic food scheme

The Science Shop participation has been stated as important for both contributing with resources for the actual construction of the system, for engaging in a very cooperative project ensuring the working of the system and for 'translating' and distributing the scientific knowledge. This was amongst other done via the many meetings, via the time spent observing and via the efforts with publishing understandable material.

The Science Shop thus contributed as a mediator of knowledge between the university and the Vognporten, enabling parents and staff in the day care centre taking the Agenda 21 aims regarding local sustainable development activities seriously, and as facilitator for spreading the local activities to a wider community.

Case 3: Obstacles to people's city bicycling

The project was initiated by the Danish Cyclist Foundation (DCF) on the background of a decrease in city bicycling and an increase in private car transport. The origin of the request was a wish from the DCF to get a more in-depth understanding the mechanisms motivating citizens to increase bicycle use (instead of other transportation).

The project was carried out by two students through the Science Shop DTU on the initiative of and with the active participation of the DCF, a national NGO with 26000 members and local affiliates in most parts of the country.

The DCF requested assistance from the Science Shop DTU to get systematic knowledge on traffic performance, as background documentation for their development of a traffic planning strategy. Assistance from the Science Shop had become even more of a prerequisite for having scientific and time resources for carrying out those kinds of projects. Government budget cuts for NGO and grass root activities had made DCF cut back on staff, though they have been one of the NGOs being professionalised in the 1980s and having been employing staff for more systematic information gathering. Despite professionalisation, the NGO still faced limited resources to having research of more general character carried out, and co-operation between DCF and the Science Shop DTU goes back to 1992 and the debate about a bicycle path on the Öresund bridge.

The aim of the project was defined in dialogue between the Science Shop, the 2 students, their supervisor and DCF as:

- An analysis of bicyclists' motives for using the bicycle as transportation mean.
- The development of internal and external strategies for DCF to motivate people to substitute car transport with bicycles.

Through out the whole co-operation process the students and the organisation were in close dialogue about both the findings and the methodology applied.

The students in the Science Shop were themselves members of DCF and active bicyclists'. They wanted to test the hypothesis that bicyclists, non-bicyclists, and traffic planners perceive bikes and bicycling differently, and that, even among bicyclists, bikes and bicycling are perceived differently as transportation mean. These very different discourses, the Science Shop students suggested, were the reason for different policy suggestions.

The students tested the different meanings and characteristics applied to the bicycle among bicyclists, politicians and traffic planners. The politicians' and traffic planners' perceptions of the bicycle as technology were analysed by going through technical as well as political documents; the bicyclists' perception of the bicycle as technology was explored through two focus group interviews.

Planners and politicians were found to perceive and think of the bicycle as an instrument for improving the environment. As a consequence they focussed on policies related to increasing the amount of bicycle paths, and improving safety in the bicyclists meeting with cars and busses, rather than focusing on difference of latitude.

Focus group interviews with bicyclist on the other hand revealed that for the bicyclists and non-bicyclists, technical issues related to the bicycle and weather conditions were very decisive for bicycle use. The one surprising factor forwarded by the bicyclists to be a barrier to bike use, was the perception of other bicyclists as a major safety problem; not cars or busses. And in the combination with this, stress turned out to be a larger barrier than safety issues, for bicycling.

The analysis thus confirmed the hypothesis of different perceptions of barriers to bicycling. Bicyclists' suggestions for actions to enhance bicycling in order to reduce car traffic, were therefore markedly different from the politicians and the traffic planners. Not that the bicyclists did not think more bike lanes etc. to be important; they were just not the determining factor for choosing the bike to the car in the short run or even at the day to day level.

Conclusions were thus very different from the by DCF expected documentation of bicyclists dissatisfaction with increasing car traffic and increasing risks. The large emphasis that the bicyclists had put on bicycling behaviour motivated DCF to expand their internal as well as external strategy and policy suggestions to also include biking behaviour:

- DCF organised a campaign on civilised bicycle behaviour.

- DCF pursued a strategy of both ensuring safety and physical conditions, and ensuring (possibilities for) better bicycling behaviour in bodies and negotiations where they were represented.
- DCF could use the results as background information when planning and conducting a local bicycle path maintenance scheme with the municipality of Naestved.

The collaboration with the Science Shop thus, especially via the systematic use of focus group interviews, arrived at new insights on motivation factors for bicyclists that could be used in increasing the number of cyclists. Inspired by the project methodology, DCF has used focus group interviews some of their later projects.

Discussion

The main argument that we have wanted to pursue has been, the still important role of Science Shops for CSOs in assisting these with:

- Scientific documentation
- Knowledge development and enhancement
- Development of strategies and constructive solutions abating or preventing environmental problems.

The changing world and thus the potential changing role of NGOs, Science Shops and local engagement, has been the concern of some of those addressing Science Shop development, and the Science Shop's current struggle for survival or diffusion in some countries. Though we may share some of the concerns, the three case studies however demonstrate, both local concern and local constructive initiatives, and the role that Science Shops may have in assisting these: both with regard to documenting and raising environmental agendas and in contributing to transform environmental objectives into practical policy or practical behaviour.

Though, as for example Leydesdorff and Ward (2005) think that environmental issues have now become part of national and international policy, and of company strategy, the referred cases demonstrate that local initiatives are still important watch dogs and constructive players in environmental development as well as having important roles in questioning the larger environmental agendas – and that Science Shops and the more systematic and science-based input is important for both legitimacy and knowledge production.

The CSOs that the Science Shops assisted in the three cases were both local as well as national organisations (with an international network), which points to the diversity in the organisations that the Science Shops assist. The most local initiative was the day care centre Vognporten, whose activities nevertheless spread to the whole municipality, and also serve as inspiration to other institutions and municipalities; DN Frederikssund was a local affiliate of a national organisation operating also internationally, which may (but did not in the actual case) spread the new knowledge as well as knowledge on the political experiences; and the DCF was a national organisation also with international contacts, focussing especially on city bicycling, and gaining results that were used in some of the local affiliates of DCF, and which may be used in cities in other countries.

The Science Shops in all three cases offered resources for more systematic or scientific work that the organisations themselves were not capable of raising: In the case of the village pond and the barriers for more people to use the bicycles the Science Shop delivered both documentation and more constructive solutions; in the case of constructing the igloo, the project came up with constructive solutions for alternative vegetable storing.

The motivations and reasons for the three organisations to approach the Science Shops were the free and easy access to scientific assistance; the Science Shop's defined role as mediators of scientific knowledge and their obligations and interest in mediating scientific knowledge to

not non-scientific clients; and their scientific legitimacy through their structure as impartial and independent.

Though both DN Frederikssund and DCF are national organisations with overarching international networks, the Science Shops were regarded an important and maybe the only access to have a science-based analysis of their assumptions that they could use in negotiations and in putting pressure on the local governments; in the case of the igloo, the Science Shops ensured them access to knowledge that made them investing in alternative storing and delivery systems, and which may have been important for daring to promote the solution to a wider system.

The Science Shops' role as mediators of scientific knowledge was prevalent in all three projects, but handled in different ways, and reflected in different collaboration forms. In the village pond project DN Frederikssund had a set idea of what they wanted to have investigated and the DN Frederikssund and the Science Shop defined the project from the beginning. Differently, the definition and limitation of the bicycling project and the vegetable storing project, developed as the work progressed, both with regard to problem definition and the methods used. Whereas the village pond project was more oriented towards the expected results, the two other projects were more open towards learning through the process, but in all three cases the Science Shops functioned as mediators of and producers of knowledge, not otherwise having been accessible to the organisations.

The role of the Science Shops for the results was prevalent in all three projects: in the case of the village pond, the documentary report stating the severe state of the life in the village pond, had not been made without the participation of the Science Shop; the surprising results of the contrasting view of planners and bicyclers for what the barriers are for getting individuals to substitute cars with bikes for daily transportation, had not been captured without the Science Shop's introduction of the focus group in the investigation; and the Science Shop delivered important input to the collaborative project between parents and the day care centre in establishing the purchase scheme and storing system for organic vegetables, by providing knowledge on demands and options for combining purchasing and storing. The collaboration project also convinced the municipality about the feasibility of the suggested igloo system.

In the case of the bicycling barrier project, emphasis was directed towards bicycling behaviour and towards easing the use of the bicycle for daily chores, as the project had demonstrated these to be important for the actual decisions on preferring bikes to cars. Traffic conditions, pollution and risk of accidents were all background factors that the bikers still wanted the council and the DCF to deal with, but for the actual (daily) decisions on taking the bike and not the car, these were less important. This meant adding traffic behaviour to the campaigns of DCF (and the city council).

The impact in the form of diffusion of the vegetable and storing system to a large part of the institutions in Albertslund Council, was an effect of the Science Shop's systematic investigation of the potentials, coupled with the close collaboration with the day care centre, ensuring that the system was backed and could be implemented in the daily routines of the day care centre.

The egalitarian and cooperative project definition and performance and the utilisation and mobilisation of the CSOs networks, most prevalent in the vegetable storing and bicycle cases, were important for the organisational impact of the Science Shop projects. This meant both an internal mobilisation effect as well as an external commitment to the findings and their diffusion. In the case of the documentation of the village pond pollution, both the internal and external mobilising effects may however be characterised as modest – the pollution was documented but traded for other political issues.

The three cases in many ways represent the original ideas of Science Shops, and as far as we can see, there are still plenty of these projects, where both documentation and the production of new knowledge will provide important insights and important participation of CSOs and other local initiatives. The democratisation ideals of the Science Shops as well as their mediation potentials we therefore argue, are still important in both raising and documenting environmental issues, as well as feeding new knowledge back into the University curricula, an agenda we however have not pursued here.

We are therefore worried about the agenda of seeing Science Shops as slowly getting obsolete; the agendas raised in the described projects had not been raised by other actors; neither had the suggested solutions being promoted by either public or private actors. Not that we do not want to discuss possible changes in the role of Science Shops. But their original role as raising environmental and other issues, with departure point in CSOs experienced problems or needs seems as important as ever.

Conclusion

What we have been trying to demonstrate in the article is that concurrently with the internationalisation and professionalisation of environmental organisations in recent years, Science Shops still have an important role to play in the empowerment of CSOs engaged in environmental issues (as well as other issues but they are not included here), by deliverers of and collaborators in the development of scientific and systematic knowledge.

The Science Shops, as mediators between the universities and their scientific knowledge production and the CSOs, are demonstrated to serve rather different CSOs, and to serve their rather different knowledge needs.

The studied CSOs were a local citizen group, a local affiliate of a national NGO and a national NGO. The article shows that projects that were initiated locally contributed to global agendas and that global agendas were taken up locally. The background for the projects undertaken was requested as:

- Documentation to be used for political pressure. A scientific report from a university was felt by the CSO to create legitimacy.
- Knowledge to be used in internal strategy development and for political pressure.
- Knowledge to be used in actual technology and system development. Again the scientific report produced by the Science Shop helped to create legitimacy when approaching the authorities.

Especially in two of the cases, the co-operation process between the Science Shop and the CSO and its network, was important for the feasibility, the legitimacy and the impact of the solution. Not that this may not have been possible to establish in more business like consultancy relations, but the absence of payment for the service of the Science Shops and the personal engagement in the projects and in seeing them having an impact, may be assumed to have influenced both parties' interest in the cooperative development of the project.

Though the focus of this paper has been to argue for the legitimacy and important role of Science Shops in both raising environmental agendas at the local level and contributing to internationally defined environmental agendas, the three cases also show how the co-operation between Science Shops and CSOs, develops the capacity of the CSOs as well as contributes to understandings of societal issues that may influence university curricula. So Science Shops are not only a tap into university knowledge, they are also important suppliers of new knowledge for scientific scrutiny and change.

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