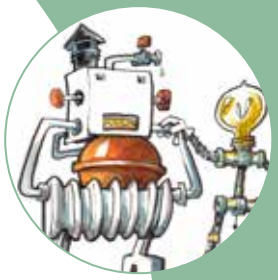
Organising Sustainability in the Digital Age

Results of the research programme Informational Governance for Sustainability 2012-2016



WAGENINGEN UR
For quality of life

Organising Sustainability in the Digital Age

Results of the research programme

Informational Governance for Sustainability

2012-2016

Editors

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Content

Foreword

The information landscape of our modern society has been drastically changed under the influence of a revolution in information and communication technologies and processes. Until recently, information has always been a scarce commodity. Access to information, acquiring and disseminating this important resource has always been an important strategic tool in public and private policy and decision-making processes. The current information landscape has dramatically changed how these things work. In the present digital age, where society is driven by ICT and globalisation processes, information is far from scarce; some people even use the term information tsunami. In this situation it becomes increasingly difficult to process the information and to sift out the useful nuggets of information from the extraneous masses. At the same time, and more than decennia ago, information has become a crucial factor in governance and decision making processes. Even to such an extent that so called informational governance is the central topic of this booklet.

Evidence for this new role for information can be found in the ways in which individuals, organisations and societies use information to address the challenges posed by sustainability. We see this in new (participatory) forms of conservation and environmental monitoring; in smart systems for energy, mobility, waste and water management and in the "Internet of Things"; labelling, hallmarks and certification of products and production chains, new "track and trace" systems and transparency, etc. At the same time, these information-based forms of sustainability governance raise new matters of concern. Examples are the issue of privacy, selective access to and acquisition of information, the verification of information and scepticism about its trustworthiness, the effectiveness of these new forms of sustainability governance by information, and the form that effective "informational governance" takes in different national contexts. All these issues are addressed in this publication.

Every four years, Wageningen University & Research itself invests in a selected number of research challenges. These investments, together with other funding, enable Wageningen University & Research to make important progress in understanding new developments and challenges. The content of these challenges is always connected to our institution's main domain of interest: healthy nutrition in a sustainable environment. The booklet you have in your hand reports on the results of a four year research programme into the role that information plays in the organisation of sustainability. This results not only in interesting and innovative outcomes from the individual research projects – as shown in each chapter – but the research programme as a whole has helped us understand how the information landscape is changing and what this could mean for organising sustainable practices. This is the main yield from all the research published in this booklet. And, as is so often the case in scientific studies, the results of this research have raised many new questions along the way.

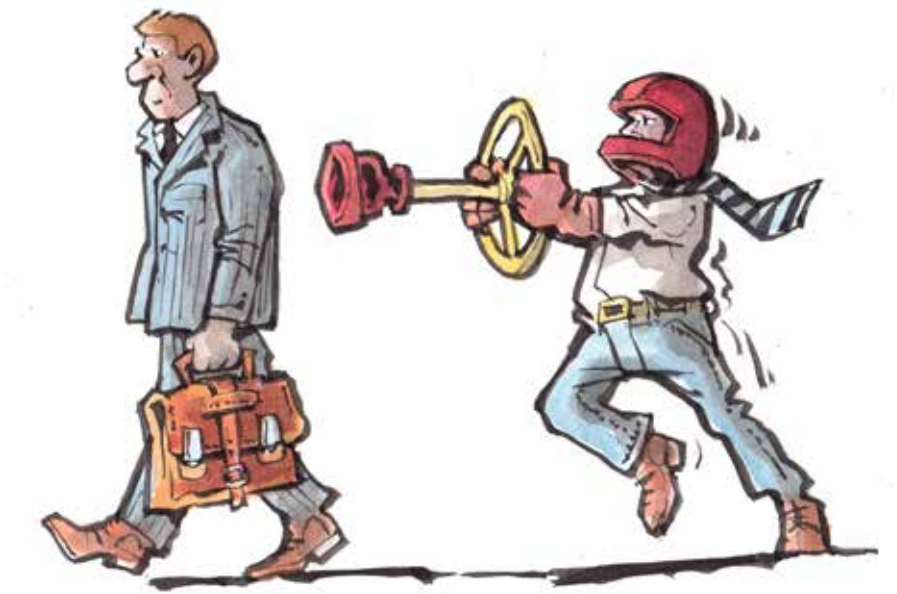
Wageningen University & Research shall continue to conduct research into the important scientific and societal questions and challenges facing us in the field of informational governance.

Arthur P.J. Mol
Rector Magnificus/vice-president
Wageningen University & Research

1. Why research the role that information plays in organising sustainability?

Challenging innovation agenda

The research programme, "informational Governance for Sustainability" studies the new role that information plays in the governance and decision-making processes taking place in tough sustainability issues. Sustainability is high on the agenda both politically and socially. Many unfolding trends emphasize the need to utilize and manage the resources and ecosystems of the world differently. The relevant developments have in common that they each intensify the effect of the other. These include strong population growth, increasing scarcity of raw materials, the changing climate and pressure on ecosystems. Promoting sustainability is intrinsically bound to innovation challenges such as completing the circle in recycling processes, making the transition to renewable energy sources, ensuring sustainable food production, maximising efficiency in ecosystem services, modifying landscapes to cope with the effects of climate change or improving conditions for biodiversity. These sustainability challenges demand a change in the thinking and behaviour of both producers and consumers, of governments and citizens, of commercial companies and public institutions in all parts of the world



The role of the state is changing

The far-reaching governance challenge for policymakers that ensues from this is extra complicated because in many western countries the state has lost some of its established power. Traditionally, land management and securing adequate food supply has been the task of the national or regional government. Exercising this responsibility was facilitated by the availability of wide ranging management options. The reform of the agricultural production systems (land consolidation) and the territorial planning in the Netherlands of the second half of the 20th century are examples of changes that could only have been been implemented because of a strongly interventionist government. Today the style of governance has changed. There is now a growing awareness that complex problems are more quickly solved when solutions are developed within the specific context of a region together with all the stakeholders. Commercial companies and public organisations increasingly take the initiative and this in turn has caused a new organisational model to develop. An important facet of this development is collective management in social networks or in public-private collaborations. These days the Dutch government calls on commercial enterprises and the public to take the lead. Terms such as the 'participatory society' and the 'pro-active community' illustrate this trend.

Another portion of the power of the state has devolved to international networks such as the EU or international certification initiatives. This is, on the one hand, because sustainability issues transcend national borders, on the other hand because the internationalization of economic chains and the strong growth in international companies has lead to international influence on how land is used. The choices that Dutch consumers make in the supermarket for their evening meal can, for example, affect forest management decisions made in Asia and South America; and price fluctuations in the global market can impact how Dutch farmers utilize their land. The potential for national governments to influence and manage sustainable behaviour in these international chains is limited. In

this evolving playing field, governments are searching for new ways to fulfil their role and new options for governing these processes.

More information for everyone

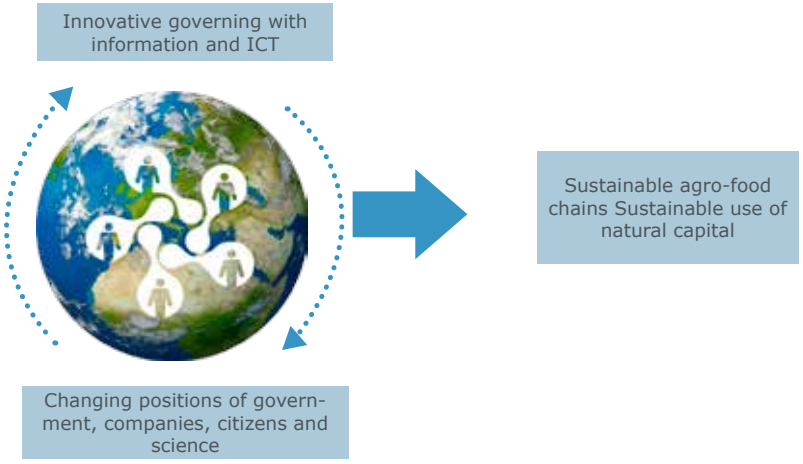
At the same time, we see the strong emergence of the information society. Information is more easily and broadly available thanks to internet and social media. The position of authority previously held by knowledge institutions is no longer self-evident. In the old days, the government, scientific institutions and commercial companies had privileged access to knowledge. These days ordinary citizens are discovering the influence they can have on governmental decision-making processes and on business strategies set out by companies. There is an old saying: 'Knowledge is power'. In this digital age, that power can be wielded by everybody. There are new collaboration forms taking place in our society. Small businesses can start up thanks to crowd-funding and private collectives organise food distribution directly from the farmer to the consumer using the internet. Governmental authorities and companies also make use of these new possibilities to influence consumer and public behaviour. These developments result in new concerns about important normative principles such as privacy, transparency, democracy, fair competition and equality.

New research questions

The research programme "Informational Governance for Sustainability" makes a connection between these developments in governance and information supply. Firstly, the question is raised as 'to what extent can information in a complex world contribute to the transition towards sustainable use of natural resources and ecosystems'? For example, what influence does the use of smart meters have on energy consumption, or what does information about sustainability do to consumer behaviour? Can information be used to initiate collaboration between parties with diverse interests.

The second question to be addressed is: 'whether the abundant availability of information, and the changing dynamics in processing that information, lead to changes in how governmental authorities and commercial companies organise themselves'? What effect do media-hypes have on policymaking for example? What does it mean when the actions of one individual can have more impact than the campaign organised by a business or research institute. So, this is not just about managing information, but also about being managed by information.

Figure 1. Network and information society

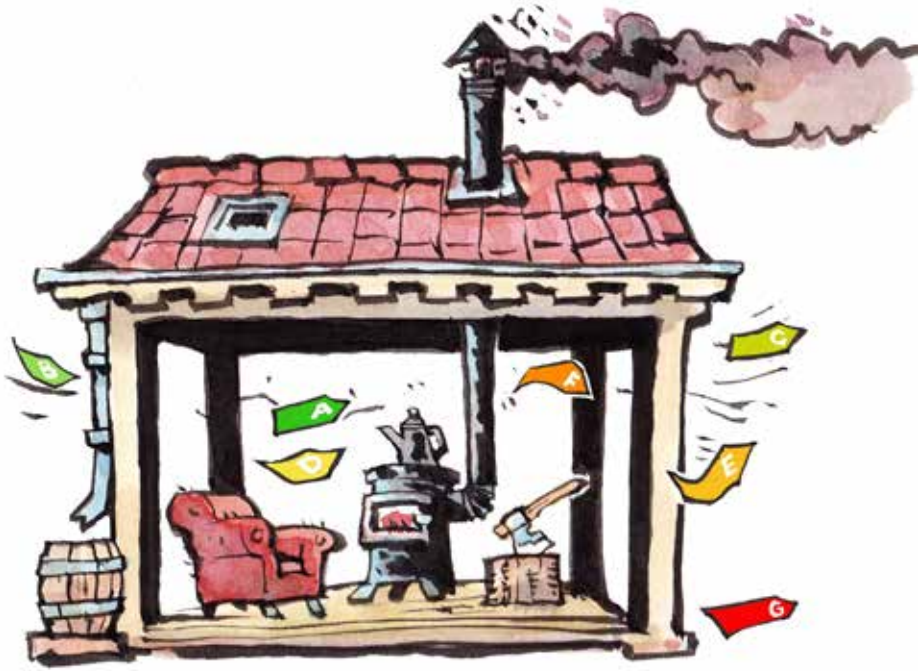


These questions have hardly been touched on by the international science community within the domain healthy food in a sustainable environment. This is the reason that Wageningen University & Research set out five years ago to launch a strategic research programme on 'Informational Governance for Sustainability'. Thirteen research projects run by different departments within Wageningen University & Research have been working within this programme. The four-year programme was completed in 2016. This booklet contains an overview of the main results and the potential for practical application. We hope that reading it will provide insight into the mechanisms that underlie the effects that information has, and that it will contribute to a more effective implementation of information and information technology to promote a sustainable society.

2. What is informational governance?

A new concept for new insights

Not only does the information society influence economic, social and scientific processes but it also affects governance processes. The term 'governance' refers to the set of activities undertaken by public, private and social actors to manage a certain sector, address social issues, or realise collective values. Sustainability issues are particularly sensitive to information because they are often fraught with uncertainties and controversies and because they cross the boundaries between different policy domains, management levels and time scales.



In order to better understand the governance of sustainability issues in the context of the information and network society, the concept of "informational governance" was developed (Mol, 2008). Informational governance looks at (1) how the use of information, information technology and information networks can lead to innovative forms of governance to facilitate sustainable development; (2) how the growing role that information, information technology and information networks play causes changes to the positions that institutions hold in governance processes; (3) how 1 and 2 mutually intensify each other's effect. The energy label is a good example of an innovative form of governance whereby information is used to foster behavioural change to further sustainable development. The development of this label was a result of innovative public-private collaboration, specifically the energy pact in which the government, businesses and social organisations agreed to reduce energy consumption. Furthermore, the introduction of energy labels itself initiated all sorts of institutional transformations, such as the new market for labelling advisors; banks who set their mortgage interest rates according to the energy label carried by the house; and new privacy issues.

Our literature research (Soma et al, 2015) revealed that most research has been done into the first facet of informational governance, namely the use of information and ICT to promote sustainability. We can differentiate six fields of inquiry. Firstly, the growing use of internet and other ICT applications in public service. It is striking that the increasing use of internet has not automatically lead to improvements in public service. Secondly, the contribution of ICT to a more inclusive regional development, whereby weaker parties can also influence decision-making and therefore can profit from higher returns themselves. Thirdly, the way internet tools and new visualisation techniques support local communities in their self- management of collective natural resources, by promoting knowledge exchange and learning processes. Fourthly, the research looks at the functioning of public standards, certification systems and eco-labelling and their dependence on reliable ICT systems. Fifthly, there has been economic- behavioural research done into stimulating sustainable behaviours by the public and consumers using information systems and nudging. Finally, the programme looked at the effect of interactive interfaces and ICT applications on collaboration between knowledge institutions and the public.

The second facet of informational governance, namely transformation of governance institutions via ICT developments, has been less researched. The literature does refer to transformations, but often strands in generalizations and hypotheses. The literature research lead to the determination of three interwoven trends. The first is the formation of new informal institutions where people develop new forms of self-organisation. This varies from organising crowd funding for conservation purposes to connecting inhabitants in remote marginalised areas. A second trend is the larger and more varied role of private parties in sustainability initiatives, resulting in new collaborations between businesses, consumers, NGOs and governments. The increase in the number of interactions between individuals is the third trend. The increase in connections that transcend traditional boundaries between regions, races and sectors has resulted in surprising sustainability initiatives. To conclude, there seems to be little thought for the less positive trends such as new exclusions, and even new sustainability issues, for example ICT waste products.

Research in Wageningen

Wageningen University & Research is not the only organisation that researches the organisation of sustainability in the Digital Age. The broad coherent attention to this issue is unusual in international scientific circles. The specific niches filled by Wageningen are its focus on sustainability; its focus on the connection between the physical and the social system, and the integral study of more intelligent governance through information and the transformation of the governance system itself. Our ambition is to make these accrued insights concrete and translate them into practical advice for governments, businesses and the general public.

The following 11 chapters will show the research results gained in the different projects under the auspices of this research programme. The first two chapters describe the influence of information technology on institutions and processes. What is the influence of smart energy systems on domestic energy consumption? How does the virtual swapping of fish quotas contribute towards making international fisheries more sustainable? These are followed by four chapters covering the role that information plays in the management of natural resources. They explain how ecological information can promote collaboration in territorial planning; how urban citizen initiatives use information; what the effect is of participatory monitoring for water management; and how scientific information is used to affect sustainable management of the arctic regions. The following two chapters are devoted to the effects of social media. The first one focuses on the effects of social media hypes relating to the animal husbandry sector. The other zooms in on the effectiveness of social media in increasing environmental consciousness. The last chapters are about three research studies into sustainability information on and labelling of products. The questions covered include: how certification works in practice; how private hallmarks for sustainability match international regulations; and whether information about sustainability on food packaging can stimulate consumers to alter their buying pattern. In the concluding chapter we discuss the degree to which we understand the processes and mechanisms playing in informational governance and what a future research agenda might hold.

Box 1. Relevant publications

Castells, M. (1996). The Rise of the Network Society, Volume I of the Information Age: Economy, Society and Culture. Blackwell Publishing, Massachusetts.

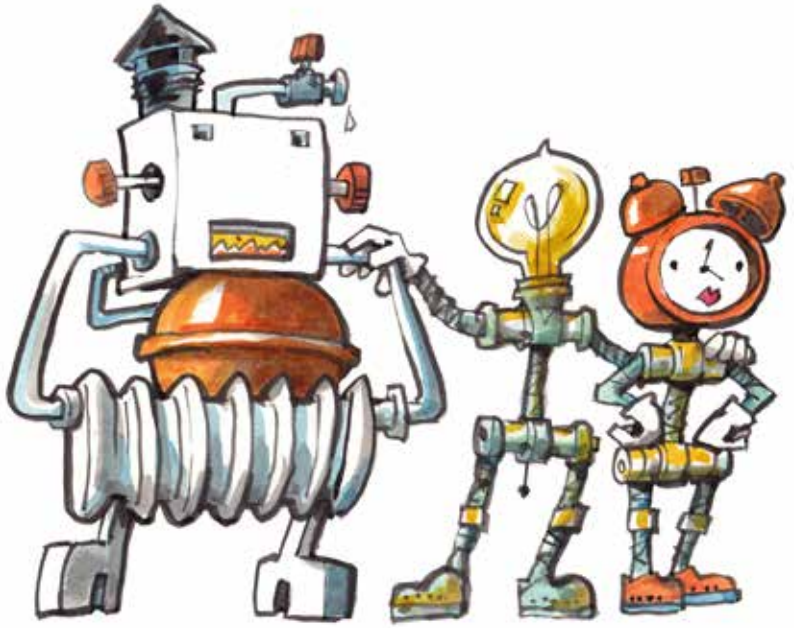
Mol, A.P.J. (2008). Environmental Reform in the Information Age – The Contours of Informational Governance. Cambridge University Press, New York.

Soma, K., Termeer, C.J.A.M., Opdam, P. (2016) Informational governance – A systematic literature review of governance for sustainability in the Information Age. Environmental Science & Policy. Volume 56, 89–99

3. Will smart energy systems inspire a turnaround in sustainable energy consumption?

Transition to sustainable energy

Since the beginning of the 21st century, energy policy in the Netherlands and in Europe has been aimed at a sustainable energy transition. The objective of this policy is to secure future energy supply and slow down climate change. Within the scope of this energy transition, the focus is largely on production and use of sustainable and decentralized energy sources, with particular emphasis on the role played by end-users. Despite these efforts, Europe - and the Netherlands in particular - has difficulty achieving the climate objectives.



The development of smart energy systems offers new opportunities to make energy production and use sustainable. The application of smart meters provides more insight into household energy consumption, while smart infrastructure can contribute to a better match between the supply and demand of sustainable energy. Researchers from Wageningen University & Research analysed the way in which households deal with smart meter information, and how this contributes to sustainable energy consumption, and what impact this intensive information exchange has on the privacy and autonomy of households as opposed to commercial enterprises and government bodies.

Energy and information flow

This research applies "social practices theory" to understand how energy is used by households. This theory focuses on mundane activities – so called practices – such as cooking, doing the laundry, watching TV and driving the car. When doing these everyday activities people use a logic specific to the practice which consists of a chain of routine actions. For example, doing the laundry normally consists of collecting the washing, washing it in a machine, and drying it using a washing line or a dryer. Energy consumption is interwoven in these activities as an essential resource albeit operating in the background.

Household energy consumption is traditionally supplied via a distribution network coupled to a central energy generation source – usually operating with fossil fuels. The rise of decentralised energy generation and smart energy systems are changing this. They facilitate new energy practices like co-production, monitoring, storage and time-shifting. Furthermore, two-way traffic in energy and information is produced and new forms of collaboration evolve between households and energy companies in new service providers or among households themselves in energy cooperatives. Figure 2 illustrates the changing flow of information between the different actors in the energy system.

Information is changing

This research has shown the relationship between information and energy consumption is much more complex than is often thought. The proposition "more energy data leads to more knowledge which then leads to better energy savings" is not borne out in practice: sometimes 'more knowledge' is where the process ends, or information is gained without resorting to using data. For example, informal information from chatting with the neighbours can have the same effect on energy consumption as factual data from a smart meter. This does not mean that smart meter

Researchers| Joeri Naus, Gert Spaargaren, Bas van Vliet and Hilje van der Horst

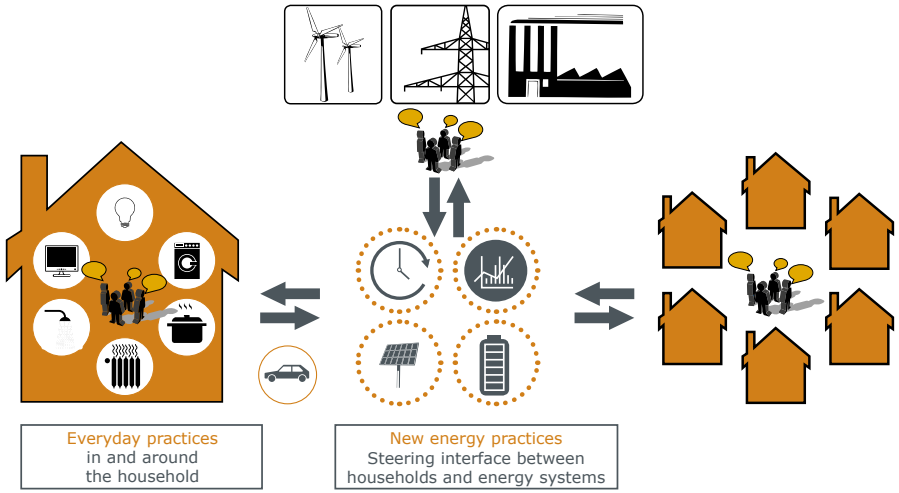
information is insignificant. Just like other forms of information, it really can play an important role, however not so much as a starting point for change, but more as relevant input when a change is already taking place in practice, such as the decision-making process involved in the purchase of a new household appliance. It is important to create a context in which energy and information are related to sustainability, and where different sustainable options become available to households.

The research has shown that privacy and autonomy are very significant factors to take into account when organising collaboration in sustainable energy projects. This is true not only in vertical collaboration (between households and energy companies) but also in horizontal collaboration (between households themselves). People make a distinction between different energy practices. For example, they can be willing to collaborate to generate electricity, but do not wish to exchange data about energy consumption with each other. For both data use and energy practices the following is true: customising is necessary for effectiveness in promoting sustainable energy choices.

Governance perspective

Measures such as providing households with user information, financial stimulation and more efficient technology, have turned out to be insufficient to cause a turnaround in sustainable energy consumption. Policy makers, service providers and project leaders should also give structural support based on equality and trust. This can be achieved using non-central partners; for example, professional intermediaries or local energy cooperatives and a governance perspective that is focused on energy practices, which arise on the interface between domestic users and the energy system. Monitoring in order to shed light on daily activities – in the fields of mobility, nutrition, care and recreation – can play a key role in furthering sustainability. This can involve big changes such as sustainable energy generation, or smaller modifications such as reprogramming a thermostat. What matters most is that they form part of asustainability transition.

Figure 2. Changing energy and information flows



Future research

This research has shown that information plays a central – although not unambiguous – role in the rise of new energy practices, but that it does not of itself lead to making energy generation and use more sustainable. In order to be able to steer towards sustainability, it is important to gain more insight into the connection between monitoring practices on the one hand and making daily practices more sustainable on the other. There is also a need for further research into the kinds of circumstances that allow monitoring practices to flourish and be effective and research into the optimal amount of support that would allow more sustainable practices to develop in the energy field.

More information

Naus, J., Spaargaren, G., Vliet, B.J.M. van & Horst, H.M. van der. (2014). Smart grids, information flows and emerging domestic energy practices. Energy Policy, Volume 68, 436-446

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4. Who benefits from 'virtual' quota swapping?

Trading fish for fish

In order to manage and utilize marine resources such as fish populations in a sustainable way, the European Union now operates a common fisheries policy. Every member state is assigned a catch quota per fish species and a professional fisherman needs a licence and catching rights to be allowed to fish. If a member state does not use the full quota, it may trade with a member state whose national fleet has a shortage for that particular species and a surplus quota for another. This is international quota swapping: fish for fish. Information and information technology play an increasingly important role in facilitating this quota swapping. This is why researchers from Wageningen University & Research looked at how the changing role of information influences the behaviour of the actors in the fisheries sector and how this influences the sustainable management and use of marine resources.

Information for sustainable fisheries

Swapping fish quotas beyond national borders has been possible since 1983. The last few years this has increased, due in part to the use of information technology in the form of Skype, email, information on websites, electronic logbooks and the European Union's Fish Data Exchange System (FIDES) as well as international networking conferences. The swapping of fish quotas is dependent on formal but also informal information exchange between individual fishermen, fishing organisations, national governments and the European Union. Officially, all quota transactions have to be formally approved by the European Union and then registered in FIDES. Before the formal transaction takes place, informal exchange of information is important. It is precisely in the informal sphere that information exchange has taken off as a result of new ICT applications. As a result, the trading process between fishermen and fishery authorities takes place more efficiently and quickly. The effect of this increased quota swapping is that the total use of the quotas in Europe has become more efficient, the total permitted fish catch is exceeded less frequently and the fishing sector has become more sustainable.

Information and social exclusion

One downside to the greater role played by informal information exchange and the importance of ICT is that the trading process is not completely transparent for all interested parties and not all fishermen nor members states profit from the quota swapping equitably. This is due to the fact that FIDES does not directly publish the information. Furthermore, most fishermen's organisations no longer publish how they have filled the quota on their websites anymore because of strategic and economic considerations. The research has shown that fishermen who are active in powerful, well informed international networks can exercise a good deal of influence on the quota trading process. ICT and information networks provide fishermen with an instrument to swap their catch rights and register in FIDES quite quickly. Fishermen with less access to information and networks are at a disadvantage in the quota swapping. A further concentration of fishing rights within certain companies results, and an obstacle to getting quotas develops within others. It is not only the increasing influence of ICT, but also the decentralisation of fisheries policy

Researchers| Ellen Hoefnagel, Birgit de Vos and Erik Buisman

that promotes this inequality and non-transparency. Decentralisation means more autonomy for the sector itself. For example, a number of years ago, the Dutch fishermen's organisations decided that it was not necessary to offer each potential quota transaction to every fisherman. This has decreased transparency and sometimes quotas are swapped that could have been utilized by fishermen in the Netherlands. The national style of management appears to be an important factor determining the degree of openness in information about trading fish quotas. It is generally thought that decentralisation fosters transparency, but that does not hold true for quota swapping. When quota swapping falls under the auspices of the state, there appears to be more transparency and equality in the distribution of quotas than when the sector has more say and quota swapping takes place in a co-management arrangement between the state and the sector – as is the case in the Netherlands. Here the privacy and economic interests of commercial companies weigh more heavily in policy than the public interest in transparency. At the same time decentralisation and bureaucratic hierarchies have obscured whose responsibility it is to publish information; the producer organisation, the national authority or the European Union.

Governing transparency

It would be beneficial for fishery management if there were more transparency in the fish quota swapping because this fosters responsibility and fairness. This research shows how ICT and information influences the informal processes involved in quota swapping. Looking from the point of view of informational governance, you could say that ICT and information are a steering force in the direction of non-transparency and exclusion. However, ICT and information can also be formally applied to steer in the direction of making things more transparent and thus contribute to a more sustainable fishery management. This could happen, for example, by organising an internet auction for trading fish quotas; publishing previous transactions; providing insight into the actual use of the quota per member state; and making FIDES available to fishermen's organisations. In this way, all interested parties would know where excesses and shortages are in quotas and this information would no longer restricted be to a select group. The challenge for the fisheries sector and the government is to use ICT in information processes to create transparency and equal opportunities in the fish quota swapping. In this way the quotas could be utilized more efficiently and individual fishermen would no longer miss the boat. This would make a more sustainable and socially acceptable fishing industry possible.

Information technology in the fisheries sector

More information

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5. Can information about ecology bring about social cohesion?

Need for cohesion

Citizens and commercial companies are both undertaking various activities to protect or improve their surroundings. In their aim to promote a participatory society, national and regional authorities as well as social organisations want to stimulate this trend without actually assuming a coordinating role. To achieve sustainable development in an area, it is essential that individual activities do not remain isolated, but that they strengthen each other socially and ecologically. Wageningen University & Research is studying the role that information can play in creating cohesion between different activities by actors in a particular area.

Ecological and social cohesion

Researchers tracked the process in two regions where conservation managers, water catchment authorities and the agrarian sector attempted to achieve consensus on landscape development. Information about ecosystem services was brought into the discussion process and researchers pointed out that investing in green infrastructure could simultaneously deliver individual and collective side benefits. The researchers followed up by analysing the progress of the consensus process. The study showed that it was precisely this information about ecosystem services that contributed to the synergy and assisted this regional development process. This effect can be explained in different ways. First of all, the information about ecosystem services makes people conscious of the fact that the landscape has something to offer that could be of interest to them. This insight stimulates involvement and leads to a pro-active attitude. In the second place, the awareness that a single element of the landscape can offer several services, places the focus on the common interest in the management of the area. When a farmer realises that the hedge on his land not only provides pest control but also contributes to water quality, it becomes an incentive to seek collaboration with the water catchment authority. Finally, the cooperation between interested parties is fostered by the awareness that certain ecosystem services can only be realised when measures are taken on a larger scale. Information about ecosystem services contributes to the creation of social and ecological cohesion in regional activities in all three of the abovementioned ways. It is interesting to see that information about the ecology of the landscape has an influence on sociological processes. Figure 3 illustrates this interaction between social and ecological networks.

Governing with information

Based on the evidence that information influences land development processes, the researchers studied the degree to which it is possible to steer these processes using information. Their study involved an experiment whereby students were asked to design a plan for a rural area. Prior to this, they were told three different stories about the added value that results from investments in green infrastructure. The story lines consecutively highlighted the socio-cultural value, the value for production of biomass and the value it had for water

Researchers| Claire Vos, Paul Opdam, Ingrid Coninx, Merel van der Wal, Art Dewulf and Eveliene Steingröver

regulation. These scenarios turned out to have an influence on the choices that the students made in their design for the area Figure 4 shows that the students took water regulation and the socio-cultural storylines into account in their design, while the economic storyline about biomass was ignored. This reveals that the values-bias of Wageningen students played a role. This, in turn, shows a clear criterion for steering using information. To be effective, the information has to have some connection to the values-bias and mind-set of the actors.

Valorisation of knowledge

The government has set out on a course to stimulate both the socialisation of conservation and the participatory citizen. This study has shown that the goal is reached more effectively when information about ecosystem services is given to social networks. In this case it is important that the value of these services is presented in the broadest possible way so that there is the greatest chance that it will connect with the values and mentality of the different parties. The challenge is to ensure that all parties realise that collective management of the landscape serves both a personal as well as a common interest. The current insights are based on a limited number of observations and internationally there is little known about the role played by information in regional planning. It is therefore of primary importance to build on these early insights and to take them to more depth by doing a variety of practical studies in the field. To assess the potential for the steering of collective behaviour using information, it is crucial to understand if and how the information effects networks that are operating without supervision. This study has discovered how ecological knowledge is processed in a social network and how it leads to collective action. When these insights have been further substantiated, it will become possible to develop products in order to support regional development processes more effectively. These could include a pamphlet outlining the way to use scientific information more effectively in socio-ecological networks or a survey to assess the value-bias of the actors in a given area and make this visible to all parties prior to beginning the regional development process. It should become possible to apply specific information about ecosystem services and green infrastructure judiciously in order to create synergy between actors in a regional setting and thus contribute to the sustainable use of the area.

More information

Opdam P., Conincx, I., Dewulf, A., Steingrover, E., Vos, C.C. & Wal, M., van der. (2015). Framing ecosystem services: a way to affect behaviour of actors in collaborative landscape planning. Land Use Policy, Volume 46, 223-231

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Figure 3. The interaction between social and ecological networks

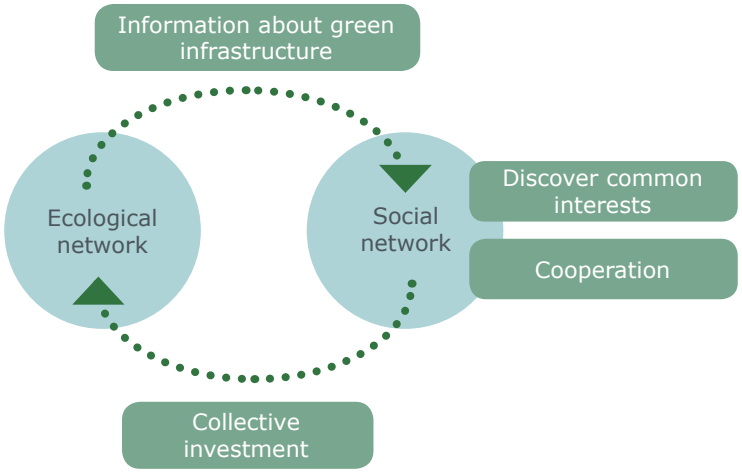
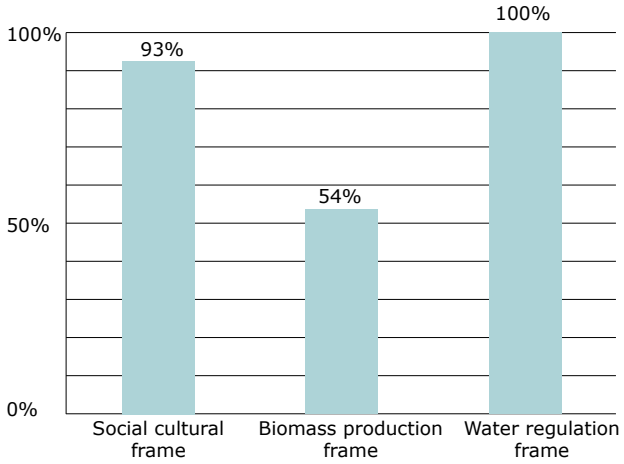


Figure 4. Consistency of planning with different frames



6. Do citizens' initiatives make optimal use of information capital?

Information and participation

In many different places in the Netherlands, private individuals are taking the initiative to work on concrete solutions to social dilemmas. It is the mirroring of the international trend towards self-organisation by citizens. In the Netherlands the trend is also called the "Energetic society" or "Participatory society". Citizens' initiatives are currently presented as the way to organise society. At the same time, we live in a digital age where the role of information and communication is ever expanding and changing. These two societal trends meet in green urban citizens' initiatives. Wageningen University & Research is studying the role information plays in the development of those initiatives formed by citizen groups at the local level.

Information for connection

Citizens' initiatives are launched by groups of people who want to have a say in organising their social and green environment, where a combination of public and individual vested interests is involved. The researchers studied 16 of these initiatives, ranging from a neighbourhood vegetable garden to a digital platform to publicize information about sustainability. During the study the insights gained were put to the participants in a learning network dealing with citizens' initiatives. New knowledge was developed in this exchange with practice in the field.

This study sheds light on the vital role of information in the realisation of citizens' initiatives. Connecting or mobilizing people and institutions to the citizens' initiative is an important factor for success. Researchers differentiate three types of connecting strategies.

- "Bonding": forming relationships with people who share the same views and share the same power base – such as neighbours.
- "Bridging": forming relationships with people who do not share the same views but share the same power base – such as people from another neighbourhood or suburb.
- "Linking": forming relationships with people who do not share the same views, nor the same power base – for example, the municipal authorities.

The degree to which citizens' initiatives successfully employ all three connecting strategies proves to be determinant for the degree of success of the citizens' initiative itself. It is, however, important to note that the way in which the citizens' initiative relates to the different parties should match the character and ambition of the initiative. It is logical that a neighbourhood vegetable garden requires a different strategy for connecting than a digital platform for new concepts for an ecological and innovative society where the connection between man and nature is a central issue.

Informational capital

Information plays a crucial role in this game of connecting: information about who the other relevant actors are, their world view and how you can form and maintain an effective relationship with them. In order to understand how a citizens' initiative develops, sociological research normally looks at social capital and human capital. However, these concepts are inadequate for explaining the role that information plays. This study reveals that the role of information in citizens' initiatives depends on the

Researchers| Rosalie van Dam, Irini Salverda, Lenneke Vaandrager, Carlijn Wentink and Jan Hassink

cohesion and the exchange within the social network and on the competence of individuals, particularly key people. The logical conclusion of this insight is that informational capital should be regarded as a third type of capital when analysing how a citizens' initiative develops.

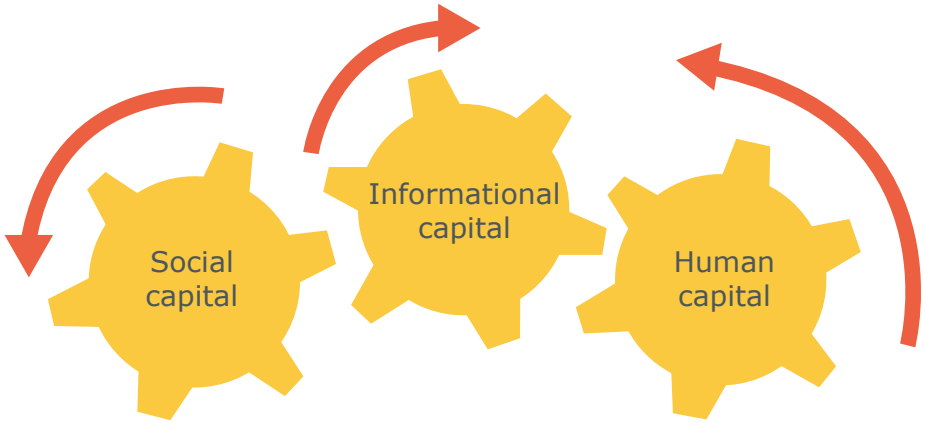
Citizens' informational capital consists of all data, knowledge and expertise that is available to them for realising certain objectives. Informational capital plays a role in the way in which a citizens' initiative functions, how it is organised, in knowing who should be involved, in convincing others to take part and in communicating its success. Furthermore, the generation of informational capital leads to new social networks. Namely, the social and human capital formed by the movers in citizens' initiatives turn out to play an important role in generating and using this informational capital. The three forms of capital strengthen each other and can be seen as three resources that make the realisation of the citizens' initiative possible (see Figure 5).

Informational capital is generated, identified, used and expanded through the relationship strategies of bonding, bridging and linking. This process works both ways and facilitates the smooth functioning of the citizens' initiatives. This process can also work in a negative way. It turns out that in several cases looked at in this study, a lack of mutual trust and underestimation of each other's knowledge muddied the waters of information exchange between citizens' initiatives and local authorities,. This meant that the linking strategy failed to work properly. The challenge is to reverse the negative spiral in order to allow constructive relationships to grow, the informational capital to increase and promote the effectiveness of both in order to realise the objectives.

Informational self governance

This study sheds light on the question as to how citizens' initiatives could generate and utilize effective information to realise their objectives; how informational self-governance works. Citizens' initiatives need to determine the state of their information capital for this, and how they want to use it, in accordance with their ambition and character to develop all three connecting strategies; bonding, bridging and linking. For governmental authorities who want to support citizens' initiatives, this study reveals the significance of transparency in information supply and the development of personal relationships and enhancement of trust. Promoting the exchange of experiences can be an action that falls within the role of the municipal authorities. This study has made a contribution towards understanding the role of information in the development of citizens' initiatives and the functioning of informational capital in interaction with other forms of capital. These insights are still fresh and only studied in the green domain. It is important to expand this study to include citizens' initiatives in other domains such as health care, education and climate change in order to strengthen and expand the findings that stave these insights.

Figure 5. Three types of capital



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7. Who is at the helm in participatory monitoring?

It's now or never

The Netherlands is facing the urgent task of making ground and surface water management more sustainable. The Framework for Water Management Directive demands a significant improvement in water quality for the coming years. The climate change issue has lead to uncertainty and new dilemmas concerning drought and flooding. Water management dilemmas are often complex, firstly because there are different actors involved, each with their own opinions and interests, secondly because the necessary expertise is often incomplete or controversial and finally the issues that need to be dealt with are constantly changing. This requires a flexible and adaptive approach to water management. Researchers from Wageningen University & Research have looked into how participatory monitoring of the quality and quantity of surface water can contribute to adaptive water management.

We're all in this together

In this study, participatory monitoring is the process whereby different interested parties are actively involved in the design of monitoring programmes, the collection of data and/or the interpretation and utilization of the results. How this involvement takes place can vary during the process. The assumption is that actively involving different interested parties ensures the contribution of local knowledge and ideas when interpreting the information gathered about the water system and for thinking up measures. Varying vested interests and perspectives will also be taken into account in the decision-making process regarding the measures to be taken, so that they will be able to count on broader acceptance.

The proof of the pudding …

A number of projects were studied that actively involved stakeholders in the monitoring process. This study found that participatory monitoring can contribute to a growth in trust between parties and to an improved learning capacity and better use of information. Experience gained during the implementation of flexible water level management in the Loosdrecht Lakes illustrated the effects of participatory monitoring. Flexible water level management means that the water level is allowed to fluctuate seasonally within certain limits. This improves water quality, restricts the need for influx of water foreign to the area and improves the ecological development of the shoreline. However, the plans for implementing flexible water levels in the Loosdrecht Lakes caused agitation in the recreational sector and among local residents and farmers. There were concerns about the damaging effects that a high water level might cause to basements and low lying properties, and the possible effect of a low water level on jetties and wooden foundations of houses and on boat access in shallow water. The rising tensions prompted the water board to communicate more intensively with the residents and other interested parties in that area and to involve them in monitoring the water management process. A number of residents and the water board intensively monitored the effects of the measures together during the course of one year. The results were sent to all parties involved every quarter and then discussed as a group.

The advantages of collaboration

DBoth the water board and the other parties involved get a better insight into the challenges of water management. It is worthy of mention that most participants

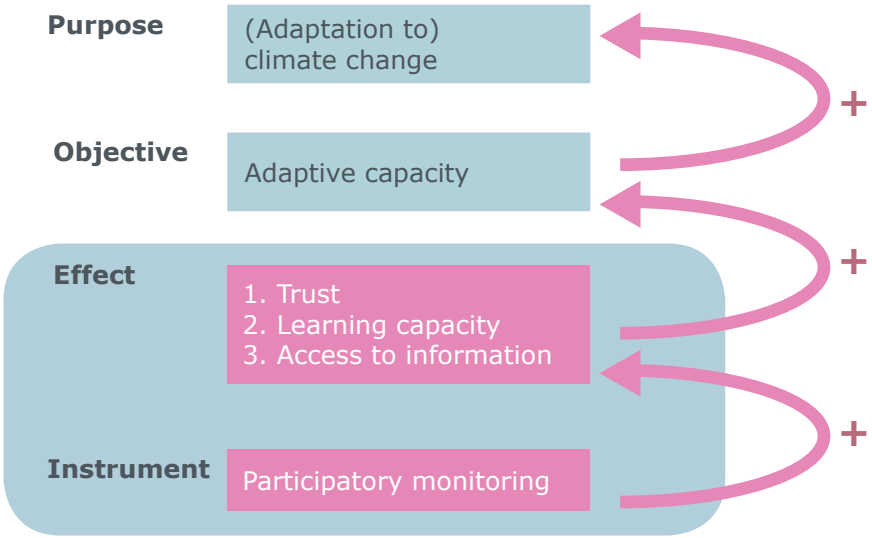
saw the data itself as factual support for their own opinion and as a way in which to check up on the water board. That being so, their knowledge about water level management has increased and they have a better understanding of the dilemmas involved and considerations that need to be taken into account. The water board also picked up new insights. The more intensive monitoring taught them, for example, that the water level in different spots could vary at the same time as a result of the influence of the wind.

The research shows that participatory monitoring can contribute to an increase in mutual trust and a more balanced relationship between parties. This is mainly as a result of improved information supply and the intensification of communication. Building trust is a crucial factor in adaptive water management because the challenge is then seen as a shared dilemma and the parties are prepared then to share their expertise and responsibilities. This is needed to address the ever changing challenges for water management in a flexible way. Figure 6 illustrates the effects of participatory monitoring.

Scaling up is the challenge

The levels of knowledge and trust seem to increase - especially between the people directly involved. In practice, it appears to be difficult to capitalise this trust, the increased expertise and insights as well as the adaptive capacity at institutional level. This can mean that an individual water board worker is prepared to try a tailor-made solution but that this cannot be implemented because he or she is not supported by the organisation. This brings us to a potential risk of failure for participatory monitoring. When there is little room for adaptive water management on institutional level, the trust that has been built up at the personal level can be quickly undermined. In one case the knowledge gained by the participants during the participatory process was even used against the water board worker, who had initiated the participative monitoring in the first place. It is thus important to improve the adaptive capacity of the water management organisation in order to ensure sufficient support and adequateprocedures to make participative monitoring successful.

Figure 6. The effects of participatory monitoring



A first step in the right direction could be to share the insights found in this study with the water management organisation and to explore together how it can best support participatory monitoring and how it could be incorporated into their procedures. Another advised option is to actively involve the organisation's policy and decision makers at the outset in new pilots with participatory monitoring. In this way, water boards can gradually learn to share the responsibility for monitoring and management with other parties involved and learn to give the insights and knowledge gained from participatory monitoring an official role in their management procedures. This makes it possible to use the positive effects of participatory monitoring for more sustainable management of ground and surface water.

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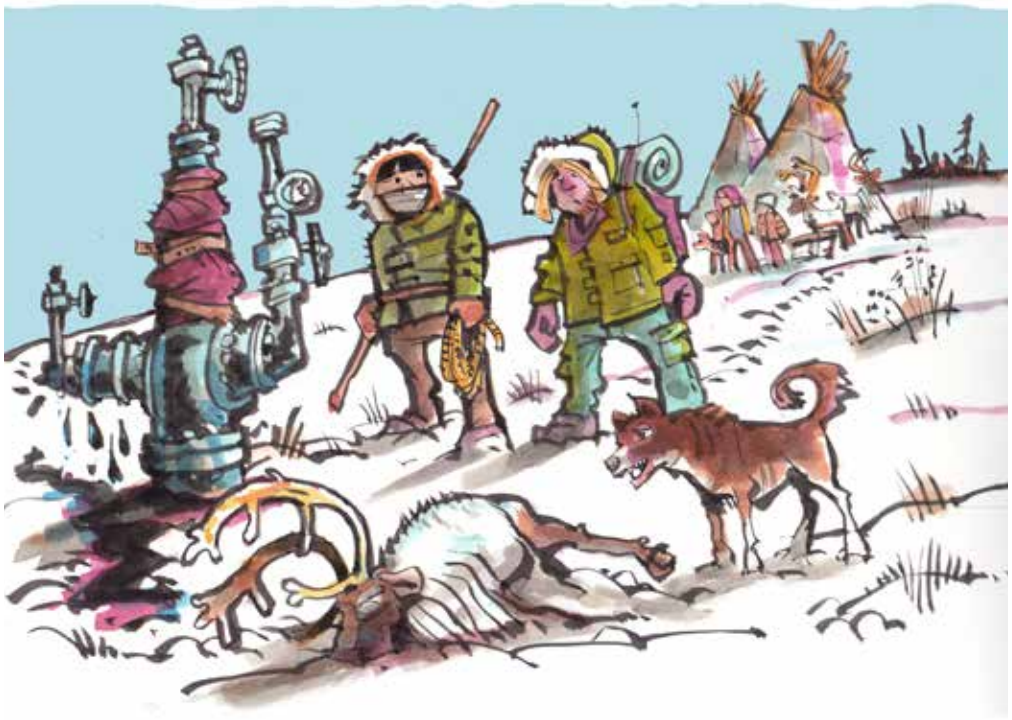
8. Does scientific information support sustainability or vested interests?

The arctic is hot

Due to climate change and retreating ice the arctic region is rapidly turning into a focal point of economic and geopolitical development. The Arctic is vulnerable to change, however, and its accelerating exploitation may pose a threat to the area's ecological quality, environmental sustainability and, not the least, indigenous population. These developments are taking place along the growing demand for environmental information. Due to the modern technological developments various stakeholders and decision-makers increasingly have access to the wealth of information, ranging from real-time data on sea-ice conditions to strategic vulnerability maps. Researchers of Wageningen UR try to understand what role all this information plays in Arctic governance



Controversial role of information

The role of information in Arctic governance processes is controversial and spins around the issues of legitimacy, trust, and power. On the one hand information disclosure facilitates legitimization of practices, builds trust between various groups of actors, and empowers marginalized groups. On the other hand, information can (un) intentionally reinforce existing power imbalances through information overflow and manipulations. The case of Numto nature park in the Russian Arctic illustrates the unexpected and diverse role of information in nature conservation and Arctic resource management.

Nature under pressure

In the case of Numto nature park scientific information is highly contested and employed by stakeholders to legitimise vested interests. The nature park was founded in 1997 by the regional authorities to preserve the unique wetland ecosystem and protect traditional lifestyle of indigenous peoples from rapidly expanding oil and gas activities in the region. For generations, the Nenets and the Khanty people have been involved in reindeer herding, fishing, hunting and gathering. The territory of the park has numerous sacred places and the lake Numto is of particular importance to the indigenous peoples in Western Siberia, it is known as 'the divine lake'. The original zoning of the park, adopted in 2001, established several management regimes based on environmental and socio-cultural value of the area. Fossil fuel exploration was allowed within a specially designated less sensitive area under strict precautionary measures. In 2004 the oil company operating in the park received the license from the federal authorities for exploration and production of oil and gas in the areas that were closed for such activities according to the current zoning. Since then the company has challenged the original zoning and put claims inquiring different use of nature area than prescribed in the zoning plan.

Researchers| *Alexey Pristupa, Machiel lamers, Bas Amelung and Maria Tysiachniouk*

Window of opportunity

In 2014-2015 the team of scientists, commissioned by the oil company, championed the new methodology based on the principle of wetlands 'wise use' promoted by the Ramsar Convention on the world scale. They evaluated and mapped through GIS layers ecologically valuable areas as well as areas of particular socio-economic and cultural importance to the indigenous population. The proposed four zoning scenarios outlined the options ranging from plais nature conservation to nature use with inclusion of oil and indigenous people's interests. The new zoning arguably aims to improve the original zoning by eliminating inconsistencies in the management regimes of the park and actually occurring activities, such as traditional activities in the wetland areas with high protection status. The environmental impact assessment presented during the public hearing in February 2016 advocated the scenario that permits fossil fuel extraction in the disputed area. However, the indigenous population of the park together with civil society organisations such as Greenpeace questioned the proposed zoning and contested the validity of the environmental impact assessment.

Biased role of scientific information

The case reveals that scientific information can serve vested interests and be legitimacy broker in pursuing aspired activities. Thus, the oil company intends to follow the formal legal pathway from the rezoning proposal by the scientists to eventual adjustment of the management regimes in the park in order to accommodate petroleum activities. Similarly, indigenous people maintain and uphold the legitimacy of the existing zoning, even though their activities may not completely coincide with the designated management regimes. In sum, the role of information is complex and not neutral when applied in a specific context. Scientific approaches may bring different results in different hands. Instead of serving as a conflict resolution tool as it was meant to, the zoning becomes an instrument to enable vested interests' ambitions.

Oil activities in Numto naturepark

More information

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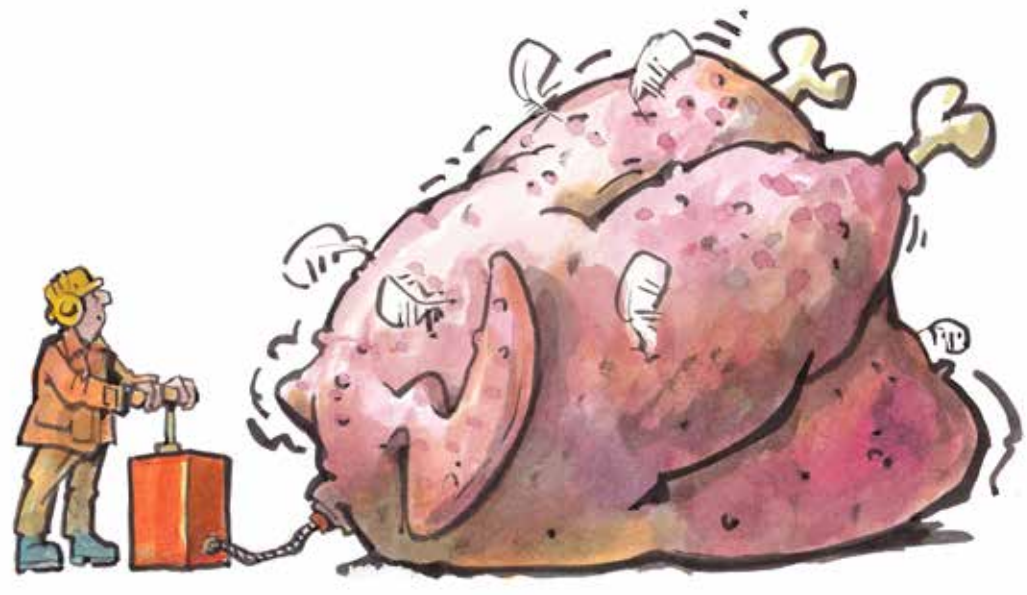
9. Do social media hypes shape the playing field for food policy?

Dynamic playing field

Sustainable food production is a popular subject for discussion. Farmers, citizens, governmental authorities, conservationists, environmentalists and animal welfare organisations all have their own ideas about it. Their interests do not necessarily match and often fundamentally differ. Social media has created a dynamic playing field where information is exchanged, opinions are aired and discussions take place. Interaction via these networks sometimes leads to intensive information streams, so-called hypes, which influence public opinion and decision-making processes. Wageningen University & Research is studying how these social media hypes come about and how they influence decision-making processes.

Types of media hypes

The researchers analysed social media discussions relating to animal husbandry from 2012 to 2015. The analysis shows three types of social media hypes: scandals, conflicts and activism. Each type has its own unique dynamic in peak activity, framing, interaction between actors and cross-media interplay.



A 'scandal' hype, the first type, involves exposing a certain abuse. The discussions are characterised by a tone of moral indignation and a search for a guilty party. An isolated incident is exaggerated by coupling it to previous food scandals. This turns it into a national news item. The reactions on social media become a source for news reports, which in turn provoke new reactions. This type of media hype has just one peak. A recent example is the horse meat scandal. The 'conflict' hype, the second type, differs in that it arises from a simple discussion about a particular subject and develops into an identity issue. It often comes about as a result of a local events or small discussions about farming, which leads to farmers and activists taking sides. The peak attention happens when the farmers feel threatened and mobilise support on social media. The conflict spreads when other parties are approached on social media, take sides and two camps are formed. Box 2 gives an example of a conflict hype around the use of the calf puller. The 'activism' hype, the third type, is characterised by sequential waves of activity. Social organisations, ordinary citizens and consumers take action against industrial animal husbandry businesses. To do this, they make use of so-called master frames. These are catchy terms, such as "factory farms" or "battery hens" which have an emotional charge and can be used in different situations to explain conditions in the sector. In the activism hype, the whole agrarian system is subject to discussion and the fundamental question of how food is produced is at the heart of it.

Prudent use of social media

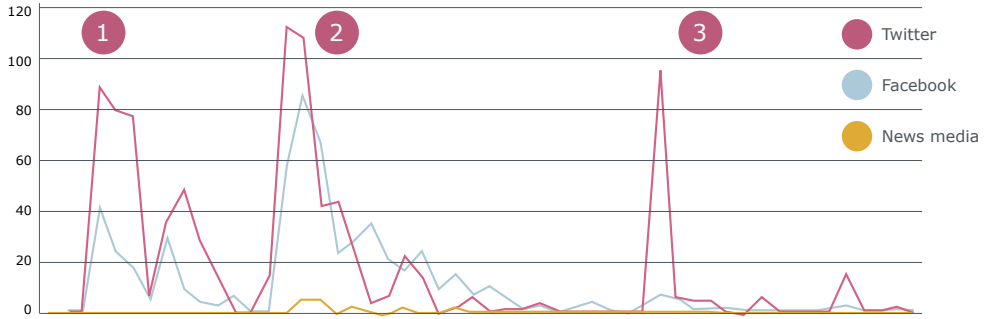
Insight into these three sorts of hypes can contribute to a more systematic and prudent exploitation of social media in order to enhance the development of sustainable food production.
It is, for example, very important for commercial enterprises to be transparent; to have information about their businesses available so that when a 'scandal' erupts, the air can be cleared at an early stage. In the case of an activism hype, businesses can best meet with the concerned parties as soon as possible to find a mutually acceptable solution and to prevent the discussion from getting out of hand. Governmental authorities can use

Researcher| *Tim Stevens*

social media as an antenna for monitoring social debate. By following the discussions on social media, policy-makers and politicians can weigh up potential political implications at an early stage. It is important to bear the self-fulfilling effect in mind; scanning social media because it is considered to have effect on policy, can in itself increase the influence of social media on policy. Another way in which the government can use social media is to use it to support the communication and collaboration between parties.

Non-governmental organisations turn out to be the most active users of social media. The insights gained from this study give them a handle on effective use of developments in social media. When a food scandal breaks, it creates a window of opportunity for groups in society to expose certain problems in the production system and to steer towards (policy) change. Scandals can lead to rigorous changes in policy, business strategies or public opinion. Aside from the clever use of emerging scandals, social organisations can also actively influence the social media discussion by coupling a report about an incident to a broader problem in the food chain. A master frame can consolidate attention and mobilise diverse parties. Via social media activity, socialgroups can wield a good deal of influence, by addressing specific parties such as supermarkets or politicians directly. It is important to do preparatory research, time the activity carefully and not only use social media but involve journalists as well. This is best accompanied by a check to see how the rural community might react to the information. They can have a huge influence on the debate, especially if they feel attacked in their identity as farmers. An interesting question for future study is how farmers could use social media proactively to strengthen relationships and their own position in the sector. It is an art to make information in content enough to flexible interpretation. It is the interpretation of various parties and their position on social media that ultimately determines how content spreads. Creating and anticipating critical moments determines whether social media represents a threat or an opportunity. Social media hypes do have an influence on public opinion and policy, but they are difficult to predict and control. Instead of a linear model for managing and planning it is advisable to anticipate discussions that might arise from interaction between different parties who are trying to steer matters using information and social media. This interaction increasingly determines the tone of the debate around sustainable food production and forms the playing field for food policy.

Box 2. A Dutch example of the development of a media hype: the use of the calf puller



1 The calf puller is an instrument that is used to assist in birthing difficulties. Using this instrument is formally illegal.On the 21st of November 2013, the animal rights NGO Wakker Dier sends an open letter to the responsible Secretary of State, asking to uphold the law banning the calf puller. Farmers counteract on social media stating that 'Calf puller saves lives'. After a week the reactions decrease, the discussion seems to calm down.

2 On the 2nd of December however the discussion takes a new direction. A 21-year-old farmer opens a Facebook page, called 'anti wakker dier'. In his first post he explains that farmers are fed up. 'These people are not fighting animal suffering, they are merely harassing farmers.' One day later the page has over 10,000 likes. The page becomes a site where various farmers air their frustrations. The hype on social media is spills over into the general news media.

3 On the 23rd of December the Secretary of State declares that the law banning the calf puller will not be upheld, but will be adjusted instead to allow the use of the calf puller in exceptional cases.

More information

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10. Is behavioural change achieved more effectively via facebook than via email?

Environmental effects of food

Current food consumption patterns are one of the more important contributing factors in environmental problems. In order to reduce these problems, it is essential that consumers, producers and policy-makers make more environmentally conscious choices. This will not, however, happen by itself. The environment is just one factor involved in the various decisions that these three groups make every day. All too frequently, the choice that is made is not environmentally friendly. The way in which we think about the environment has changed with the advent of social media. Wageningen University & Research has studied how different media, specifically social media, contribute to the environmental consciousness of consumers, farmers and policy-makers.

The impact of social media

Figure 7 gives an overview of the aspects of social media usage that have been studied within different user groups. The study first looked into the unconscious impact of information dissemination via social media on environmentally friendly consumer choices. Various experimental online studies have been undertaken. Respondents were given the same information via different media channels and via websites with varying designs. Then they were asked how important they thought the environment was and how environmentally friendly they were prepared to behave. The results show that the same information about the environment leads to more environmentally friendly behaviour when that information is spread via social media than when it is addressed privately. This is because people feel more social pressure on social media and give more 'politically correct' answers and resolve to behave in a more environmentally friendly fashion. Sharing information via, for example Facebook, has been shown to have more impact than via email or a website.

Along with the unconscious impact of social media, the study looked into the level of participation on social media by dairy farmers and policymakers. In general, it was found that dairy farmers do not participate actively in social media. They make use of internet, but only to gather information that they need for their daily business practices. This included weather forecasts or information about new sustainable animal husbandry techniques. They used social media even less than this in their business practice. Should they become passive participants, this could help them to respond better to the changing demands made by society and the market. Active participation in social media could make it easier for dairy farmers to have real influence on the image of their sector in the community. However, the study revealed that dairy farmers make little use of these possibilities and are in general reluctant to take part in social media.

The study also looked into how policy-makers use social media and how they react to discussions on internet about food production methods. There is a difference between the behaviour of politicians and that of public servants. The interviews revealed that politicians very actively participated in online discussions, whereas public servants were more reserved. Public servants do follow social media and in this way they participate

Researchers| Marleen Onwezen, Anne Charlotte Hoes, Trond Selnes and Sander van den Burg

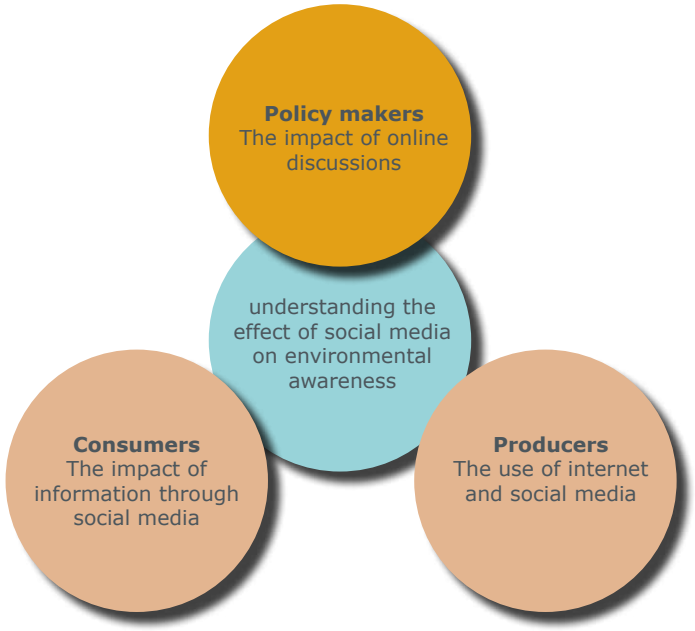
passively in social media discussions. By following the discussions on social media, public servants stay up-to-date on the environmental issues that play in the community and this brings about more awareness of those issues. Some public servants increasingly use social media actively as an instrument to promote consciousness. However, many hesitate to play a more active role because they fear that their remarks will be taken out of context by the public and be represented as being the opinion of the government. Codes of behaviour are now being developed as a means of helping public servants handle social media in a constructive way.

Effective use of social media

It has been shown that social media can contribute to increasing the environmental consciousness of consumers, producers and policy-makers. Social media are becoming increasingly important and the possibilities offered by social media are also expanding. Becoming conversant with social media costs time and energy but it can offer good returns. Although the groups covered by this study use social media already, the different results show that the use of social media could be more effective. Below we have set out some tips for parties that want to use social media to improve awareness about sustainable food consumption and production.

- Aside from the standard hints to be concise, and punchy on social media, it is important to keep a finger on the social pulse.
- This can be done by making other users and keeping track of "likes" on reports placed there.
- The success of social media is mostly measured by its reach. However, success is not just about the quantity of reactions, but also about the impact. By offering a forum for discussion, users can actively participate in an issue and this in itself increases awareness.
- Active participation is important. By participating in online social media initiatives, consumers and producers get a voice in environmental issues. They become more environmentally conscious but also strengthen society.

Figure 7. Three target groups and three perspectives



This study has shown the relevance of social media for environmental consciousness. Future research is needed to understand how a more active participation on social media by consumers, producers and policy-makers can be stimulated and how each party can best fulfil its role. It is also important to research to what extent more environmentally conscious comments on social media leads to more environmentally consumer behaviour and how this can be enhanced. The insights gained can be used to stimulate more sustainable choices and the move towards more sustainable food production.

More information

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11. Do people actually read information about sustainability?

The cost of food production

Food production can cause negative environmental effects that are not reflected in the price of food products in the shop. The question is whether information about environmental effects fosters more sustainable consumer choices so that the societal cost of food production and consumption is reduced. By using a virtual supermarket, Wageningen University & Research studied the effect of sustainability information on consumer behaviour and how this information can be presented most effectively.

The virtual supermarket

The virtual supermarket consists of three large plasma screens or a pair of virtual reality glasses. It has been developed to research consumer behaviour. Test subjects 'shop' in the virtual supermarket and their behaviour and decisions are monitored. Everything in the virtual supermarket can be modified, from the shelving and the product choice to labels on the products. This makes it possible to quickly acquire insight into the effectiveness of different ways of presenting information. The picture on the right shows how fruit is presented in the virtual supermarket.

The study compared three different ways to make the environmental impact of a product visible; so-called information arrangements. In the first arrangement, the environmental impact was expressed via a coloured label with the product classification A-E (left in picture 4). In the second arrangement, the same information was expressed in points (right in picture 4). In the last arrangement the extra cost of the impact on the environment was expressed in monetary terms (€0.13-0.89). In one version of the last arrangement, the extra cost was not only publicized, but was also added to the price of the product so that the consumer actually paid the extra cost of less sustainable products. Remarkably, when only the information about the extra environmental cost was given with a text such as "this product should be 10 cents more expensive because of environmental costs" consumers bought it more frequently! They seem to see the amount mentioned that they do not need to pay, as a sort of discount.

Adding the real environmental cost to the product price had little effect on buying behaviour. More detailed information via an app about origin and transport turned out to be less effective than simple indicators on the shelves. The possibility of consulting extra information via the smart phone was hardly used by consumers in this experiment.
The consumer wants easy access too. 'Economy of effort' is not always the main factor, though. The points system turned out to be more effective in influencing buyer behaviour than a simple indicator with three colours. Perhaps the more precise nature of the point system makes it easier to compare, or its precision fosters consumer confidence in the reliability of the information.

The impact of sustainability information on consumption is dependent on many factors; the content, the channel, the framing and the way in which information is presented all have a large influence on consumption behaviour. Merely giving

Researchers| *Lan Ge, Eva van den Broek, Jos van den Puttelaar and Coen van Wagenberg*

information is no guarantee for consumer behavioural change. It is essential that the information supply is tuned to the information demand and the personal values held by the consumer. The demand for an app like "Questionmark", which suggests alternative products with a better score on environmental impact, animal welfare and health, demonstrates that there is a desire for information about environmental impact.

Steering consumer behaviour

The results of this project give businesses and governmental authorities tools to help modify their communication strategies in order to stimulate sustainable consumer buying behaviour. The most important recommendations are to offer easily comprehensible sustainability information in a simple way, and at the same time offer the consumer a clear direction for sustainable behaviour. The impact of information can be increased by tuning that information to the perceived need and personal values held by a group of consumers within their physical and social context. The strategy is to make consumers aware of the possibilities they have for behaving and seducing them into making sustainable choices. Experiments using the virtual supermarket can be used to optimise the provision of information for a specific situation.

The 'real' price of food

As well as influencing a single choice made by a consumer, making behaviour more sustainable is a gradual process that takes time. It would be interesting to investigate the role that sustainability information on products has in the long term. In order to get more clarity about the effects of sustainability information on consumer behaviour, it is also important to look at the long-term effects of labelling. Connecting information about sustainability to the price seems to be a promising strategy. Further experimentation is required to study how this can be best designed. Questions that need to be addressed are: to what extent is it possible to determine the 'real price' of products on the basis of available information on sustainability? In what way will this information about the 'real price' affect consumer behaviour? Which institutional arrangements are needed to ensure that the information about the 'real price' is accepted by the consumer? Finally, it is important the supermarkets are involved in the attempt to get consumers to behave in a more sustainable way and to reduce the negative impact of food production and consumption on the environment.

Fruit display in the virtual supermarket

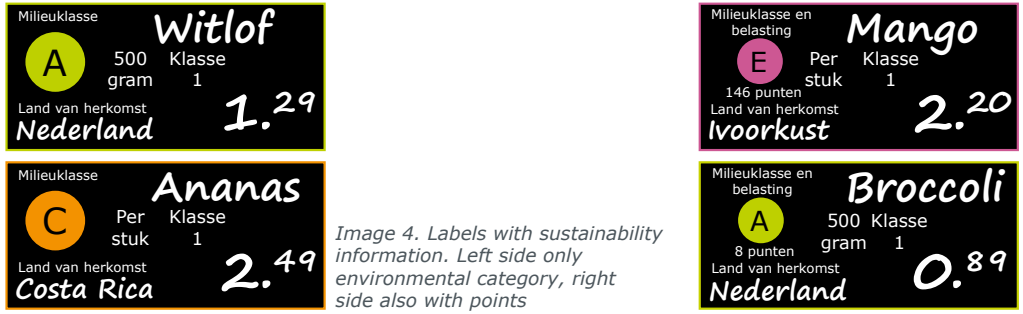

Image 4. Labels with sustainability information. Left side only environmental category, right side also with points

More information

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12. Is the government responsible for private sustainability certification?

Sustainability as selling point

The sustainability of food production receives increasing attention these days. By showing themselves to be sustainable, producers can distinguish their products in the market place. Sustainability hallmarks allow consumers to make a distinction between sustainable products and normal products. Western countries see these hallmarks as instruments to foster sustainable consumption.

Consumers themselves turn out to be limited in their capacity to understand the underlying significance of hallmarks. Wageningen University & Research is studying how to clarify and rationalise the huge stream of sustainability hallmarks and how they comply with the legal frameworks set out in international and European legislation.

A preliminary inventory reveals that there are approximately 65 hallmarks giving information about how sustainable a food product might be. Examples are the UTZ and EKO hallmarks – a large number of other examples can be seen in picture 5. There is a great diversity in sustainability hallmarks, in number as well as legislative

character or underlying standards. This can confuse consumers and in turn compromise the confidence they have in any hallmarks. Because of this, the potential for trustworthy hallmarks to foster sustainable consumer behaviour is reduced.

Coupling legal and consumer sciences

Coupling insights from the fields of legal and consumer sciences can contribute to the strengthening of the potential that hallmarks have to legitimately foster sustainable consumer behaviour. Legal studies are inclined to focus on conceptual insights, but have less interest in the practical application of legislation in the field. Consumer science concentrates on consumer behaviour and sometimes comes to conclusions that are legally unworkable. One example is the insight gleaned from consumer science that negative labels work better than positive. That being so, in practice sustainability hallmarks are voluntary and producers are not inclined to place negative labels on their products. Governmental authorities are restricted in their potential to force producers to do so. Follow-up to this study will contribute to the development of effective sustainability labelling by coupling legal science with consumer science in order to design labels that comply with legal criteria.

Relation with commercial law

The increase in the number of private sustainability hallmarks fits the trend that has taken place in the last few years. Quality control has gone from regulatory instruments used by classical governmental authorities towards market driven regulatory instruments used by social organisations, branch organisations and public-private cooperatives. Sustainability hallmarks develop voluntary sustainability standards for products and, in this way, intervene in the market for food products. Sustainability hallmarks have taken over traditional governmental tasks such as regulation, monitoring, compliance and enforcement.

Researcher| *Eva van der Zee*

These sustainability hallmarks can have a detrimental effect on the freedom of international trade. For example, it is not unlikely that producers in developing countries could have difficulty paying costs of certification, or they may have no access to the process methods proscribed by the hallmark. The World Trade Organisation has laid down binding regulations between countries to promote free trade. As private hallmarks can restrict free trade, it is relevant to see to what degree private hallmarks comply with the legal framework set down by the World Trade Organisation. The results of this study offer more clarity about the measures that governmental authorities should take with regard to the use of private hallmarks.

Free market and sovereignty

A different but comparable issue that this study raises, concerns the question whether hallmarks undermine the free market. In the Netherlands, for example, a good deal of attention is given to improving animal welfare. This was originally put on the agenda by NGOs, but has increasingly become a matter of attention for commercial enterprises. Recently, a number of supermarket chains have agreed to replace non-sustainable chicken (carrying the negative epithet, plofkip) with a more sustainably produced chicken, so-called Hollandse Kip. The Dutch Free Market watchdog has called the supermarket chains to order because the agreement contravenes regulations forbidding cartels. One feature of these regulations is that a cartel can be permitted if it serves consumer interests. However, the watchdog viewed thisarrangement with Hollandse Kip as not significant enough in serving the interests of the consumer to warrant the forming of a cartel. They determined this by finding out how many consumers were willing to pay the extra for the Hollandse Kip. In view of the fact that sustainability but also a broader public interest, the question arises as to whether this should also be considered and the degree to which it is possible to formally accommodate this public interest in the watchdog's decision-making process.

Image 5. Different sustainability hallmarks

This research is still ongoing. Although the issues are becoming increasingly clear, the contours of the answers are just starting to take shape. Offering clarity in the current issues and the considerations that need to be taken into account, can be a step towards providing scaffolding for the national and international bodies involved in the debate and help them determine a strategy. In collaboration with businesses and governmental authorities, guidelines can be drawn up to develop more effective and legally responsible sustainability hallmarks. It would be interesting to follow up with a study on the effect these hallmarks could have on sustainable consumer behaviour by testing this, for example, in a virtual supermarket.

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13. How can orderly certification rules be applied to a messy reality?

Black box

While the rise of environmental certification programs has generally been seen as a good way to ensure environmental sustainability by the public, there is a distinct lack of understanding of how such certifications are actually done in practice. One such certification scheme, led by the Forestry Stewardship Council (FSC) is one of the largest forestry certification schemes on a global scale, and as such its trademark is found on many goods. However, the mechanism that makes the FSC brand meaningful, the forest audit, is largely a black box. Researchers of Wageningen University & Research explored how audits are performed and attempt to address this blank space in a wide-spread and widely accepted method of environmental stewardship.

Decontextualized value in context

Forest auditing is a way for society to outsource the understanding of the complexities of forest management. Consumers simply trust the certification and assume auditing is a transparent and objective quest for the truth. Our work following the training of FSC

auditors and observing FSC certification audits in Spain, Tanzania, and the Netherlands illustrates that reality is far more complicated and messy. Figure 8 illustrates these two views on the certification process. While being trained, auditors are told to focus on facts and observations while simultaneously paying attention to unspoken or subtle cues. For example, auditor-in-training are assessed on how well they pay attention to body language, both their own, and that the "interviewee". Likewise, while relating an audit story between auditors, a "hunch" can be an acceptable piece of evidence to lead an auditor to other observations. However, none of this counts as evidence for the final audit report.

Clash of realities

When the checklist of a standard is taken into the forest, the clash of realities can be quite austere. Examples from the Tanzanian case are the requirement of a postal address which is not used locally and the unfamiliarity of auditors with the local practice of preventative burning. For example, again in Tanzania, in order to harvest the wood from the forest at the end of a road, the villagers must cross a large river, where there is no bridge. The villagers must cross the river by truck. This practice does not seem to comply with FSC standards because it could cause erosion problems. In order to comply a bridge would need to be built, or the crossing point upgraded. However that would cost tens of thousands of dollars. Another concern is that the standards leave little room to stimulate sustainable forest management by valuing the effort the villagers are doing to improve towards sustainability. The issue of appropriate footwear demonstrates this issue. The FSC standards require boots with metal toe protector while working in the forest. These kind of boots are very expensive, if at all available in the area. The villagers did start wearing rubber boots when going to the forest which does not meet the letter of the standard. This issue was not resolved during the audit, with the two auditors debating the issue. On one hand rubber boots were a huge step forward, as they usually go barefoot, on the other hand it did not meet the standard since rubber boots do not provide maximum protection. When

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the messy reality of forest management meets the orderly rules of forest certification, the outcome is often the result of negotiations between people involved rather than tidy facts. Despite the de-contextualized value of the certification scheme, the audit is driven by the context.

Lost innocence

In terms of governance studies, this research highlights the fact that informational governance might have lost its innocence. What we mean by this is that the production and use of information for governance purposes has become so inextricably intertwined with each other as to render the value judgement of information questionable. This is not a problem that can be solved, but rather a tension that must be accepted when studying governance processes. In practice, the political production of information is acknowledged and performed in such a way that neither the legitimacy of governance decisions nor the authority and validity of the experts involved in information generation is contaminated. The research questions transparency and makes the invisible visible. Standards tend to make a lot of the complexity that goes into certification invisible. By opening up the dynamics of environmental certification beyond the closed world of the audit to include the everyday experiences of auditors and forest managers on the receiving end, we bring to light phenomena that would otherwise remain silent and hidden.

Reality check of certification process

Understanding how the standard certification process is translated into action could open the conversation between forest auditors and third party certification organizations on their own practices. This would allow standard makers to create more realistic standard language, and allow auditors the freedom to express the messiness of reality during an audit. Another challenge presented by this research is to translate general standards to local contexts, so they will become more meaningful to local communities and thus could stimulate them to improve their forest management. As we have established the co-constructive and interpretive nature of environmental auditing, a next step would be to proceed with some form of co-learning with stakeholders in forest certification (and other environmental certification sectors) to interpret our findings into actionable goals for specific contexts.

Figure 8. The traditional view of environmental auditing (top) vs. a more realistic view of environmental auditing (bottom).

More information

Cook, W.C., Bommel, S. van & Turnhout, E. (2016). Inside environmental auditing: effectiveness, objectivity, and transparency. Current Opinion in Environmental Sustainability, Volume 18, 33-39

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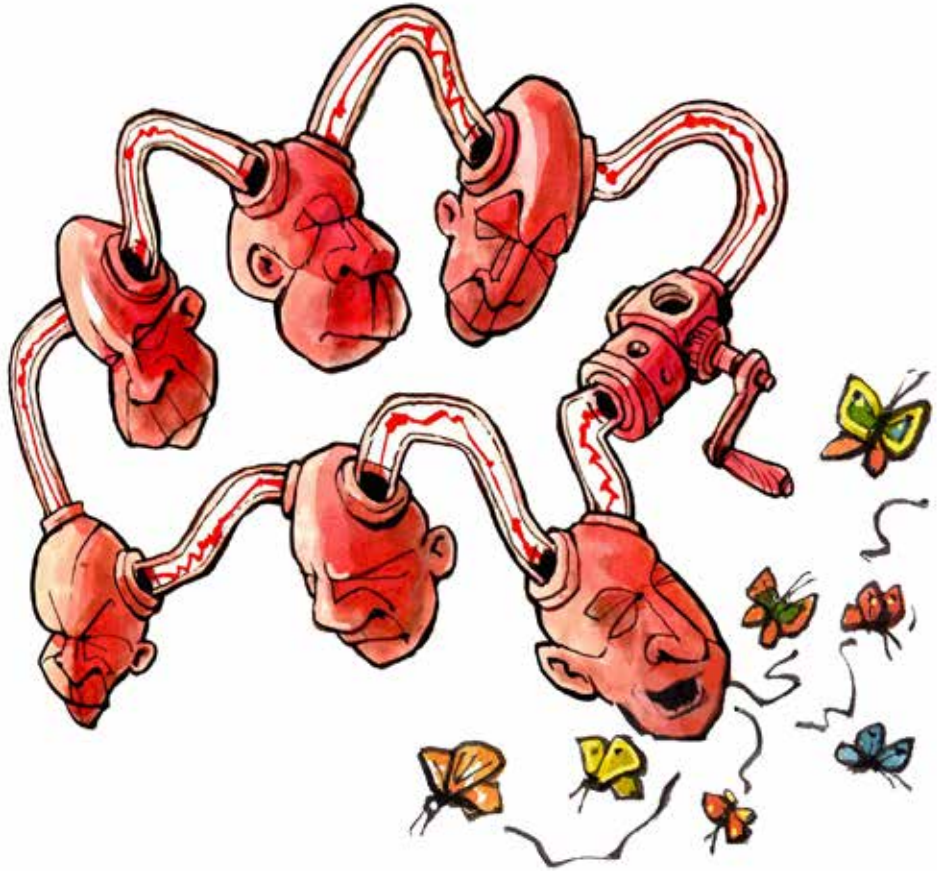
14. Synthesis and conclusions

Information and behavioural change

Measuring does not necessarily lead to knowledge, and knowledge, does not mean that it will be acted upon in practice. Simple information on sustainability becomes knowledge only when it has been selected and interpreted personally. This happens within the context of a person's standards, values and practices. If and how information results in new behaviour depends among other things on the degree to which this information matches a person's frame of reference – for example the importance a person attaches to sustainability. Its influence is also dependent on how the new information fits into daily practices.

How information is processed by individuals is heavily influenced by group processes and social networks. People interact with each other in these networks and give meaning to available information and to the developments in their surroundings. Trust plays a big role: people are more likely to assume information is relevant if they trust the source. It is apparent that information gleaned from social media about sustainable food production, for example, has more influence on thinking about sustainable buying than information that comes via email or internet. Furthermore, the visibility of behaviour in social networks is important for the level of impact of information.



Information about sustainable food chains and sustainable management of the green blue space can more effectively steer behaviour if the framing is better matched to the standards, values and practices of the general public and if the information is embedded into social processes. Scientists and policymakers can improve the impact of their information by framing it and by joining existing participatory processes.

Information and collaboration

Sustainable management of chains and of the green blue space cannot be achieved without collaboration. In regional planning processes, this collaboration is fostered by information that gives insight into landscape functions and how these functions correspond to the common interest. It is important to highlight how both individual and common interests are intertwined and how they depend on mutual effort to be achieved. Disseminating this information can speed up and intensify the process of collaboration. This factor can be taken into account by professionals involved in facilitating regional planning processes.

Institutional change

The studies in this programme have shown that the advent of the digital age has caused dramatic institutional changes, namely, changing of authority, new forms of democracy, unpredictability of developments and more volatile faith in the trustworthiness of institutions. These four trends are strongly linked and offer new opportunities for sustainability, but also lead to new dilemmas and paradoxes.

Institutions such as large commercial enterprises, the government and knowledge institutions - that formerly had a monopoly on information about sustainability - see that non-critical acceptance of their information is no longer a matter of course.
These days, everybody can be a knowledge producer and shares this on social media. This has led to an information paradox: on the one hand information plays a greater role, but on the other hand there is less credence given to it. The almost unlimited availability of information and new ways to share it, offers opportunities to capable citizens and enterprising businesses to actively participate in organising sustainability. In this way, the development of the digital age has made new forms of democracy possible. At the same time, it has caused new forms of exclusion, because not everyone is able or wants to take part in these direct forms of democracy.

The advent of social media has also resulted in new opportunities and dilemmas. On the one hand it fosters new collaborations but on the other it contributes to an increasing unpredictability in information streams. Research has shown that information via social media can cause a rapid turnaround in thinking and behaviour. Examples in the agro-sector, as in the case of the plofkip [battery hen], suggest that a turnaround like that is difficult, if not impossible to predict and therefore cannot be steered by just using policy. Going with the flow and small interventions done at the right moment is the strategy that has replaced the old control mode. Finally, we see an increasing volatility in levels of trust. Information exchange and more transparency can foster higher levels of trust between parties. On the other hand, information has also been shown to fan the flames of mistrust when it is used unilaterally to promote bias. Information dissemination via social media can speed the growth of mistrust as well as trust and in this way contributes to the volatility of confidence in information.

Figure 9. Three levels of change

	First order Do same things differently	**Second order Do different things**	**Third order New values**
Examples	Support fish quota swapping	Private certification	Self-organisation through social media
Institutional change	Formal and informal systems. Less transparency, End of equity principle	Synergy, rivalry and tensions in governance. New markets of standards and auditors	New norms, rules and routines
Dilemma's	More effective, yet more exclusive	Uncontrolled growth, fair information vs competition	New exclusions. Role of legislator and representative democracy

Perspectives for action

A number of perspectives for future action have been highlighted in the above paragraphs. These include framing or facilitating by using content. Here we will look more systematically at the use of insights about informational governance on perspectives for action for policy makers, commercial enterprises and social groups.

Three levels of action can be discerned:

1. Improvement to existing governance practices (doing the same things better)
2. Development of new governance practices (doing other things)
3. hanging the fundamental paradigm underlying governance (new values and standards)

While levels 1 and 2 largely relate to steering processes by using information, level 3 touches on institutional changes. One notable conclusion is that interventions at level 1 or 2 can also trigger institutional changes. Figure 9 shows an overview of the three levels.

14. vervolg Synthese en conclusies

First order:

doing the same things better

This first order deals with the use of information and ICT to improve existing steering processes and instruments. One example is using information technology so that fishermen can swap fish quotas more quickly and efficiently. The steering instrument (the fish quota) does not change, but the swapping process is made easier. This seemingly innocent supply of information turns out to have an effect on the fish quota market. Because this information about availability of fish quotas is no longer controlled by the authorities, and because not everyone involved has equal access to information technology, the principle of equality – every fisherman has equal access to information about quotas that can be swapped - is put under pressure. Doing the same things better can also cause changes to institutions – in this case, compromising the fairness of the fish market.

Second order:

doing other things

The second order concerns the use of information and ICT to develop new steering instruments or to set up new decision making processes, without modifying the underlying values.
The previous chapters have provided many examples of this, varying from participatory monitoring and smart meters, to sustainability labels and private certification systems. The latter is an example of how businesses take the initiative to realise sustainability goals instead of waiting for or fighting against governmental regulations. They exploit the possibilities offered by information and ICT to introduce private forms of steering. In this way, the power to steer processes transfers from governmental authorities to commercial enterprises and social organisations. Another facet to the change that certification has brought about, is the resulting string of new dilemmas that in turn require new perspectives for action. Dilemmas such as the exclusion of small farmers who are unable to pay for certification, the explosion in the number of certificates and strains they cause on the agreements made with the WTO. Doing things differently not only influences institutional changes, but also leads to new institutional dilemmas.

Third order:

new values and standards

The third order is all about the radical changing of underlying values and standards. The development of a sharing economy that is organised by using social media is a form of radical change. An example of the sharing economy is airbnb. These initiatives precipitate a fundamental change in principles of ownership and market control and they chafe against the standards, rules and routine of existing institutions. The first signs of these changes have been signalled in our studies. The smart energy meter and the resulting changing interface between households and energy system creates radical changes to the energy market and its existing power structure. Participatory monitoring in water management has caused farmers to consult with their neighbours about the water level and helped them to feel responsible for the general good. This shift has consequences for the public role of the water catchment board as guardian of the water system, it begs the question: how can they give more responsibility to the farmer without losing sight of the public interest involved in the water system. We have not seen ICT being consciously used in order to change underlying governance paradigms during this research programme. However, institutional change has occurred as by-product of first and second order steering interventions using information and ICT.

Research agenda

The research programme Informational Governance for Sustainability has revealed a broad picture of the many aspects relating to organising sustainability in agro-food chains and the green blue space. Aside from a large variation in insights, methods have been developed for analysis and ideas for interventions. There is still a lot to learn. We see future research taking place along the following lines:

Onderzoeksagenda organiseren van duurzaamheid in de informatiesamenleving

1 Theory development about the mechanisms behind informational governance

The cases studied offer interesting new insights but provide just a fragmented picture of the underlying mechanisms. There is a need for theory development about the mechanisms behind the steering through information. Strengthening the theoretical basis requires an analysis of an extensive data base with case studies in differing situations.

2 Institutional change.

The literature analysis (in Chapter 2) revealed that there is relatively little research done into the effects that information, information technology and information networks have on changes in governance institutions. This has been addressed in the programme, mainly incidentally. To acquire more systematic insights into institutional change, further analysis is needed whereby the reactions of institutions to information and information driven interventions are followed over a period of time.

3 Social media as complex adaptive systems.

Unpredictability is an important characteristic of information in governance processes. The capricious patterns in social media and the uncertain effects of interventions relevant here. Insights provided by complexity theory, namely adaptive systems, can help us to understand this dynamic better and help to develop an intervention repertoire.

4 Trust and informational governance.

Many case studies have shown that information and information tools are important for the functioning of social networks and the development of self-steering initiatives. Trust is the glue that holds these networks together. More research is needed into the influence of information technology on trust. When does ICT foster or hinder the building of trust. How can people assess the reliability of information? Do the extensive information streams encourage people to share information more readily? How can social capital and information capital intensify each other's influence?

5 Do the changes lead to a more sustainable world?

The focus in most of this research has been on the analysis of changes in attitude and behaviour and of institutions that play a role in different sustainability challenges in the green domain. The question of how these changes work out for sustainable use of ecosystems, water resources and raw materials is only incidentally touched upon or addressed as a side issue. There is a need for more comprehensive research into the impact of the observed institutional and behavioural changes on the management of food systems, multi-functional landscapes and energy consumption.

Information is everywhere and for everybody. New scientific insights are available on the internet without restrictions. Social media are a means to exercise political power. We are flooded with hallmarks on products indicating their sustainability. But what are the implications of this information revolution for the ability to organise a sustainable society? Is science undermined or does the Information Age provide opportunities for a bigger influence? Does the power of the government erode or do new forms of governing arise? These and other intriguing questions are addressed in this report of a four year research programme of Wageningen University & Research.

Colofon

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