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MULTIFUNCTIONAL LAND CONSOLIDATION EVALUATION FROM AN AGRICULTURAL ECONOMICS PERSPECTIVE

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Abstract

The paper presents preliminary results form a real-life project in which five economic services are pursued through multifunctional land consolidation processes: Farm economics; Biodiversity; Clean water; Recreational opportunities; and Development of rural communities. The analysis is based on the first results from three Danish case studies where land consolidation is used to facilitate multifunctional land consolidation. We find that the multifunctional goals are generally aligned with agricultural economics goals and the optimal consolidation of land plots are not fundamentally differing between economic services with different goals. The fundamental benefit from this approach is local ownership to process and results due to the collective policy formulation. One more specific lesson learned is though, that access to recreational activities such as hunting and horseback riding, which is tied to the ownership of land, may indeed represent significant value to the landowner and this can highly influence the scale and scope of the consolidation.

Keywords: Land consolidation, Collective policy formation, Denmark

Introduction

Multifunctionality has been present in the debate over agricultural and land use policies for the last two decades and offers a framework for understanding the processes that lead to provision of the different goods and services related to land use. As the agricultural sector is the dominant land owner in most countries specific attention has been on the multifunctionality of agricultural land use. In an early paper by Ilbery (1991) multifunctionality is describing diversification as a fairly recent phenomenon, where the main objective is to justify the generation of extra income through production of other goods than those traditionally connected with agricultural output. Diversification has been

applied as a mean of diversifying the product portfolio and accumulating capital. A paper by Knickel (2000) outlines the complexity of the rural development processes that specifically relate to the phenomenon of multifunctionality. More so, Knickel (2000) establish an overview of the complex interrelationships and a change involved in the rural development process and stresses the need for data in order to make quantitative assessments of the derived effects. Finally, Losch (2004) describes the dispute in Europe and WTO concerning multifunctional production from agriculture as a terminology for ascribing agricultural policy schemes. Thus, the multifunctional view of agriculture offers a framework for discussing strategies for sustainable development as it goes beyond questions concerning productivity and competitiveness.

A working definition of the term multifunctionality is proposed in OECD (2001) as the production of commodity and non-commodity output jointly produced in agriculture. The concept hereof and the discussion of whether to support multifunctional outputs in the European Union (EU) has been ongoing for a couple of decades. The reorientation of the CAP towards multifunctionality is viewed by some as a positive development for sustaining agricultural support schemes but is also comes with some criticism. The literature review of multifunctionality related to agricultural land use show, that the primary motive for addressing the subject is to justify redirecting the EU Common Agricultural Policy away from production based subsidies towards provision of environmental and landscape goods and services. This has been criticised by e.g. Rygnestad et al. (2002) and Kyed et al. (2008) who address the issue that an efficient level of support depends on the nature of effect pursued which may vary from country to country implying that the interactions between one dimensional policy instruments and multiple policy objectives may not be straightforward.

Nonetheless, producing agricultural output sustainable is necessary to gain societal acceptance. Sustainable production is understood as producing food with minimal environmental and climatic food print. Some parts of the world are vulnerable to agricultural externalities primarily related to environment and biodiversity where climatic vulnerability is a global issue. Biodiversity and environmental vulnerability can even break down to regional and local differences which is also making conflicts over agricultural production regional or local. If local conflicts over agricultural production can lead to local animosity against the farmer producing agricultural products even though the

farmer fully complies with the multifunctional production schemes applied at the EU-level this can reduce the societal acceptance of agricultural production.

Alongside mainstream economic approach other suggestions for policy settings takes a more process oriented view on achieving solutions based involvement of stakeholders, thus utilizing the resources and ideas present in the local community. This type of collective policy formulation is described by Ostrom in her work on Common Pool Resource (Ostrom, 2010), and forms the inspiration for the Collective Action approach elaborated in this paper. We argue that this process has the potential to lead to true multifunctionality and locally shared visions for rural communities benefitting not least agricultural production.

Thus, departing from the literature on multifunctional land use and the related policies, this paper report from a real-life project based on the Collective Impact approach testing a multifunctional land consolidation process and we are arguing that true multifunctionality can be obtained more fundamentally by involving local decision makers and interest groups in designing the initiatives and setting the goals. With local involvement and local interest in reaching multifunctional goals e.g. within clean water, biodiversity, rural development and recreational opportunities together with reduced land fragmentation the externalities from agricultural production can potentially be reduced together with improved farm economy.

The structure of the paper is as follows. First the Collective Impact land consolidation project: "The countryside as a double resource" initiated by The Foundation Realdania is described. This is followed by a short description of the land consolidation process in Denmark. Then experiences form the initial phases of the land consolidation project with respect to facilitating multifunctional solutions are discussed with an agricultural economics persepective. Last, the findings are discussed.

The Danish land consolidation project

In 2014 The Foundation Realdania initiated a land consolidation project: "The countryside as a double resource" where the objective is to solve multiple societal problems by a single process. The project is initiated with the aim of developing new solutions to some of the societal challenges currently faced in relation to land use in rural areas.

The approach to solve complex societal challenges is deemed important to reach a common goal. The approach is called "Collective Impact" and five key aspects have proven important for an Collective Impact process (Kania and Kramer, 2013):

- Common agenda
- Joint data and measurement
- Mutual obligatory actions
- Frequent and open communication
- Support organisation

In the current land consolidation project a common agenda has been built reflecting a Collective Impact process initially proposed by the Committee of Nature and Agriculture (Natur- og Landbrugskommissionen, 2013). Departing from this common agenda a steering committee was established involving stakeholders from agriculture, forestry and other NGOs representing nature preservation, recreational activities, recreational fishing, and local authorities. The responsibility for coordinating the activities lies with a working group backed up by a secretariat financed by Realdania. Joint data and measurement is given a high priority by assigning a group of scientists to follow the project and evaluate the outcome. Thus, five research groups have been engaged covering the following themes: Water quality; Biodiversity; Recreation; Agricultural economics; and Rural development. The impacts on the five different research areas are measured simultaneously with joint data and maps.

The organisation of the Collective Impact project is presented in Figure 1.

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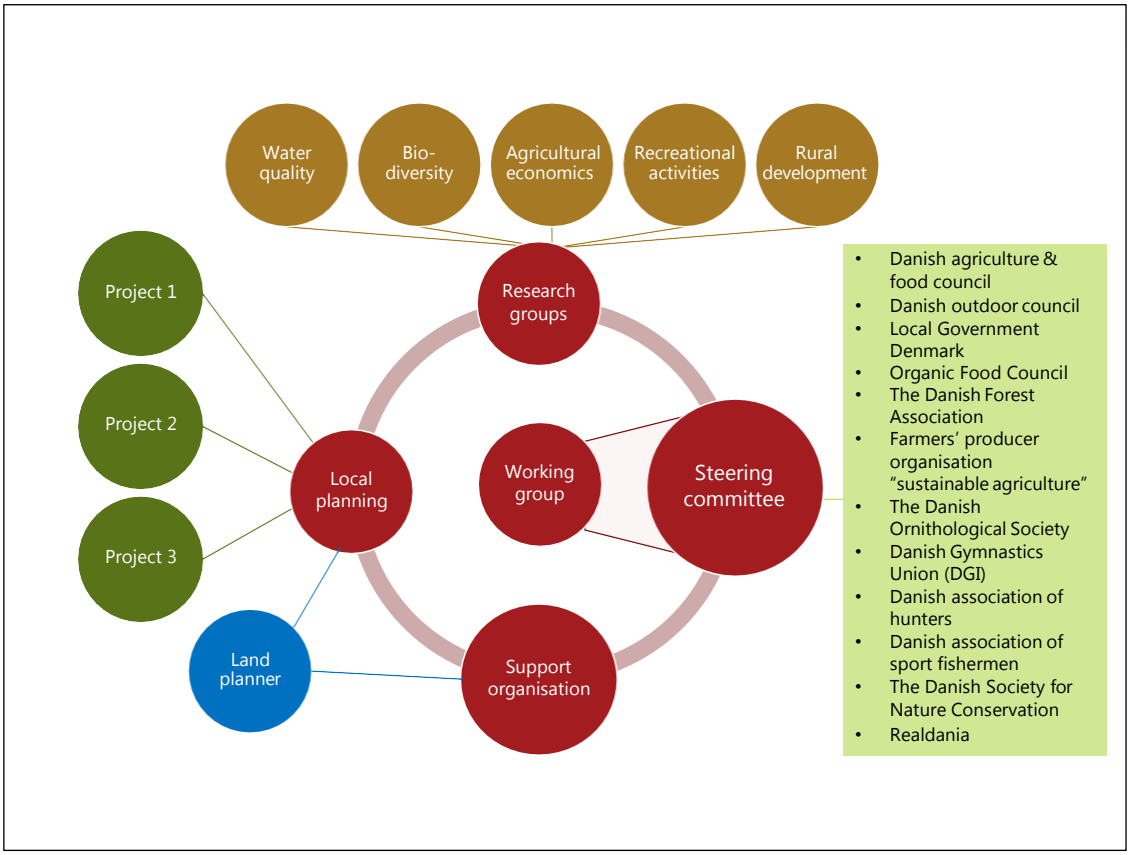

Figure 1. Organisation of Collective Impact project: The countryside as a double resource. Source: Own visualisation based on Realdania (2014).

The findings by Kania and Kramer (2013) stresses that; First, the *common agenda* is important implying that all participants should have a shared vision for change including a common understanding of the problem and a joint approach to solving it through agreed upon actions. Second, *shared measurement* is mentioned in order to collect data and measure results consistently across all participants to ensure efforts remain aligned and participants hold each other accountable. Third, *mutually reinforcing activities* should secure that participant activities can be differentiated while still being coordinated through a mutually reinforcing plan of action. Fourth, *continuous communication* across the many players should be supplied to ensure trust in the process, assure mutual objectives, and create common motivation. Last, *backbone organization* in terms of a separate organization with staff and a specific set of skills to serve as the backbone for the entire initiative and coordinate participating organizations and agencies.

The actual land consolidation process is currently under implementation in the Collective Impact projects located in Lønborg, Jammerbugt, and Fjends. In figure 2 the location of the three project areas appointed by the steering committee is shown. The areas in Lønborg

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and Jammerbugt are basically heath areas where the agricultural outcome is rather limited. The areas in these two land consolidation areas are located close to non-farmland areas making e.g. hunting for deer and red deer more attractive. The land consolidation area in Fjends is much more productive in agricultural terms and conflicts over usage are less pronounced.

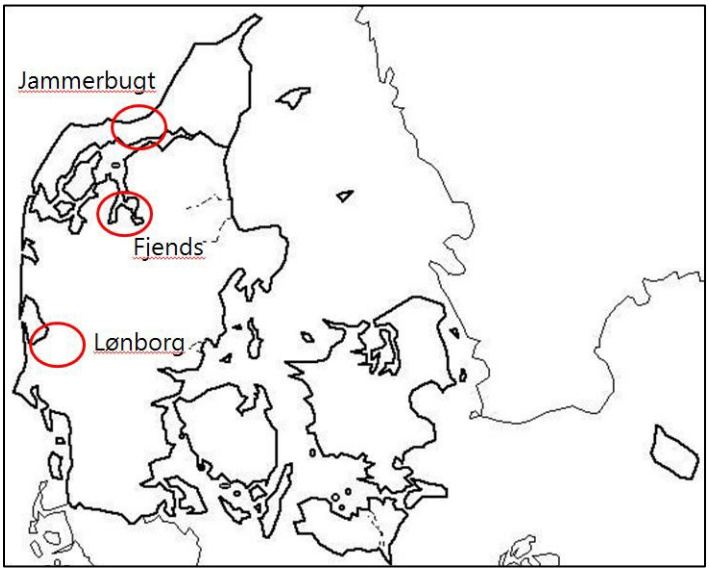

Figure 2. The location of the project areas.

During the land consolidation process some guidance from the research groups can be requested by the local municipality employees responsible for the process. An important precondition for the land consolidation process is that the landowners' participation is voluntary and landowners can chose to opt in or opt out at any time. Thus, frequent communication and numerous meetings are crucial to justify that the land consolidation project is beneficial to all the involved stakeholders.

After completion the land consolidation is being evaluated by the research groups with respect to the five themes represented by research areas on the basis of joint maps on land use changes following land consolidation.

Land consolidation in Denmark

Traditionally land consolidation is the reallocation of agricultural parcels with the aim of establishing larger parcels for landowners in exchange of their former smaller and fragmented land plots (Hartvigsen, 2014). Land consolidation projects can be driven by landowners alone but because of the need for coordination between landowners they are

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often facilitated by a ”central planner” – either the Division of Land Consolidation under the Ministry of Environment and Food or private consultants.

Land fragmentation is a well-known problem within agricultural economics (King and Burton, 1982). Agricultural land fragmentation addresses the interaction between farm productivity and the size, shape and location of the fields (Latruffe and Piet, 2014). If fields are small, have odd shapes or are located at large distance of the farm buildings the variable costs of production and, thus farm productivity will be affected negatively because of increased labour costs, reduced capacity of the farm machines and restrictions on crop choice (Olsen et al., 2016).

For many years the Danish Department of Land Consolidation, Ministry of Environment and Food has initiated land consolidation projects with the purpose of increasing farm productivity through reduced land fragmentation. In the last 20 years, land consolidation has evolved from primarily aiming at improving farm productivity to also dealing with more complex land use problems. In particular, land consolidation has been applied to facilitate projects aiming at restoration of wetlands or re-establishment other types of extensive land use on former farmland, in order to enhance the production of environmental (public) goods. In this case, the landowners need to be compensated for the restrictions in land-use and this may be done by pecuniary transfers to the affected landowners or by the central planner purchasing land which is then offered as compensation for the loss of farming opportunities. In the latter case the land consolidation can be termed multifunctional as it both aims at improving farm productivity through reduced land fragmentation *and* increase the production of environmental goods by decreasing agricultural externalities.

Multifunctionality; synergy and conflicts

As seen, land consolidation has until now primarily had a one-dimensional focus, i.e. either the purpose has been on improving farm productivity or the purpose has been to provide public (environmental) goods. However, in most land use planning processes numerous purposes are present and will imply trade-offs by the political decision makers or the local communities.

During the process, the research group surveyed generic synergies and conflicts between multiple visions for land use (Johansen et al., 2017) and realized that visions for productive

and sustainable agricultural production to a large extent could coexist with visions related to Rural development, Recreational activities, Biodiversity and Environment. Agricultural production should be allocated to robust fertile land, not adjacent to lakes, ditches and vulnerable habitats with high degree of biodiversity and in order to reduce the agricultural externalities it is necessary to allocate funds to buy out farmers who own vulnerable land. If farmers can produce on robust land with low levels of externalities there would be an argument for reducing the general compliance rules for multifunctionality thus reducing the need for income compensation.

In other words, the collective policy formulation has revealed a potential to produce agricultural products combined with a coherent local vision encompassing relevant local interest groups and this could even be done by using part of the funds used to compensate farmers for compliance costs by use of true multifunctional goals. In many instances the result of the land consolidation process would not be that different from unidimensional consolidation with focus on land fragmentation in agricultural land primarily because the different visions represent different functions and types of goods related to rural land use. Hence, some goods produced can coexist and often there is synergy associated with coexistence of goods partly because the premise for looking at synergies between different visions is that farmers can have land substituted with other land if he/she so wishes.

The terminology of normal goods and public goods are central terms and listed in Table 1. A private good is a good which is subject to be traded on a market and where the demand is negatively correlated to the price of the good. A public good is not subject to market transactions and, thus, has no market price as it is characterised by being non-excludable and non-rivalrous. Non-excludable means that producers of the good are unable to exclude other persons for consuming the good and non-rivalrous means, that one person consumption of the good has no effect on other persons' access to consume the same good. Last, club goods should be mentioned which are goods that are excludable but non-rivalrous, at least until some point.

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Table 1. Economic characteristics of the goods affected by the collective impact process

	Private goods	Public goods	Club goods
Water quality	Yes, provides the basis for commercial fishery	Yes, aquatic biodiversity	Yes, better recreational opportunities
Biodiversity	No	Yes, terrestical biodiversity	No
Recreation	Yes, may support activities of recreational outfitters	If increased recreational opportunities leads to better health, this is a pecuniary externality due to reduced health costs	Yes, privately owned recreational sites e.g. hunting and horseback riding
Farm economics	Yes, directly determined by agricultural outcome	No	Yes, in case of establishment of common grazing locations
Rural development	Yes, activities in rural areas	No	Yes, some of the benefits of living in rural communities can be characterized as club goods

As described previously, the land owners in Denmark only engage in land consolidation voluntarily and this makes it especially important to be aware of other excludable or rivalrous goods that are important to land owners. One example experienced in the project derives from a meeting with the stakeholders in the Collective Impact project located in Lønborg. During the meeting it was revealed that access to recreational activities tied to the ownership of land such as hunting and horseback riding, may indeed represent significant value to the land owner. Thus, these non-pecuniary private economic effects should be part of the economic understanding of the processes together with the trade-off between farm economics and the provision of public goods. An apparent conflicting land use is recreational activity and hunting. In this particular case the farmer was extracting good hunting opportunities due to the proximate location to the non-farmland area. Concern was expressed that entering in the land consolidation project and allowing the recreational activity on the non-farmland area would potentially have a negative impact on the hunting utilization both in the project area and adjacent areas. This “tragedy of the commons” type of externality is known from management of common pool resources (e.g.

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Schou and Bregnballe, 2007) where the management of the resource on one location affects the availability of the same resource on other locations.

Discussion

According to Kania and Kramer (2013) the collective impact process and results are emergent rather than predetermined. Further, the necessary resources and innovations often already exist but have not yet been recognized, learning is continuous, and adoption happens simultaneously among many different organizations. This falls in line with the learnings from involvement of local stakeholders in the first of Danish project areas (Lønborg) where a range of ideas and visions for developing the local community was put forward, indicating available resources for realizing part of the potential within the local population.

The Danish case shows that it seems possible to initiate processes where local stakeholders are involved not only as recipients of authoritative decisions but as providers of resources and ideas and utilizing the strength in local ownership to decisions about future use of land resources. This gives rise to more true multifunctional use of land resources benefitting not only recreational activities, water quality, biodiversity, rural development but also agriculture. This should also be seen in the context of legitimizing production of agricultural output with environmental externalities.

With respect to the usefulness of the collective impact process for providing solutions to multifunctional land use processes two important and potentially conflicting issues should be addressed. First, the local authorities need to be able to assimilate the ideas from the local stakeholders and let their input guide the outcome of the process. If not, the bottom up provision of resources into the process and the commitment of the local community to find solutions is at risk of being jeopardized. Secondly, the importance of setting the boundaries for the outcome of the Collective Impact process should be stressed. This is especially important if other interests than those of local importance are affected by the land allocation process. Examples could be protection of environmental goods or natural heritage sites or other interests of regional or national importance. This may cause limitations for the outcome of the project which needs to be made clear from the beginning of the process.

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