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Irrigated agriculture and environmental sustainability: an alignment perspective

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ABSTRACT

Irrigated agriculture is a key policy issue in many countries since it is the major user of water and land resources while it also threatens environmental sustainability due to the overexploitation, degradation and pollution of water and soil resources. Given its cross-cutting, unstructured and relentless nature, the negative impact of irrigated agriculture on environmental sustainability can be considered as a wicked problem. Building on the integrative approaches to governance, we introduce cross-sectoral alignment as a concept to analyse such wicked problems and operationalise it with three interrelated criteria, namely, actor representation, issue boundaries and working procedures. We apply the concept with empirical data about irrigated agriculture in Turkey, a country that relies on agricultural production in rural areas, expands irrigated agriculture and experiences increasing environmental problems due to irrigated agriculture. The analysis of cross-sectoral alignment in Turkish irrigated agriculture reveals various obstacles to a high level of alignment as well as opportunities to improve the level of alignment. Relieving the obstacles and benefiting from the opportunities is essential to improve cross-sectoral alignment and hence alleviate the negative impact of irrigated agriculture on the environment.

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1. Introduction

Irrigated agriculture is strongly associated with water and food security in both developing and developed regions of the world, and also with poverty reduction in developing countries (Rosegrant et al., 2009). Huge investments are made and infrastructures such as dams and irrigation canals are built to extend irrigated agriculture, which is expected to bring much higher yields and income compared to rainfed agriculture. Particularly in the arid and semi-arid zones, the majority of scarce freshwater and land resources are allocated to agricultural use. Irrigated agriculture is practiced on 20% of all cultivated land and it generates about 40% of global agricultural production, while constituting 70% of total freshwater withdrawal (Siebert et al., 2005; Molden, 2007). Despite its positive economic and social impacts, the negative effects on natural resources, especially the overexploitation, pollution and degradation of water and soil are experienced inevitably and often remain uncompensated (Umali, 1993; Postel, 1999; Pimentel et al., 2004; Molden, 2007; Rosegrant et al., 2009).

Water, energy, agriculture, land use, rural development and environment are the main policy sectors that interfere with irrigated agriculture. These sectors have different, and sometimes conflicting, objectives making them 'rivals' regarding the use of institutional, financial, and more importantly natural resources. To be effective, all the policies should be integrated, i.e., designed and implemented coherently across relevant sectors (Knoepfel and Nahrath, 2005). The governance mechanisms of natural resource use in irrigated

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agriculture would alleviate, and ideally prevent, the negative impacts. However, experiences from various countries show that the fragmentation of policy sectors is among the major causes of environmental problems (Knoepfel, 1995; Duda and El-Ashry, 2000; Ananda and Herath, 2003; Bressers and Kuks, 2004; Herrfahrdt-Pahle, 2010).

The negative impact of irrigated agriculture on environmental sustainability can be considered as a ''wicked problem'', since it is *cross-cutting* across multiple policy sectors and levels, *unstructured* due to uncertainty and disagreement about its causes and solutions, and *relentless* with never-ending issues at stake (Weber and Khademian, 2008). Our aim with this paper is to improve the theoretical and empirical understanding about the wicked nature of such problems through analysing them from an alignment perspective. As we explain further below, such a perspective implies the examination of the relative influences and pressures of multiple policy sectors on environmental sustainability. We focus on the context of developing countries (including low- and middle-income countries and emerging economies), where the social and political constraints as well as the lack of institutional capacity and financial resources challenge the relevance and feasibility of integration across multiple policy sectors. We propose the concept of cross-sectoral alignment to examine the intertwined influences of policy sectors and their implications. The following questions guide our theoretical framework and empirical analyses:

- What are the criteria to analyse the wicked problems in environmental governance, with particular relevance to the social and political contexts of developing countries?
- Based on empirical findings about the environmental impact of irrigated agriculture, to what extent are the multiple policy sectors aligned among each other? What are the obstacles and opportunities to improving cross-sectoral alignment?

The outline of the paper is as follows: in Section 2, we start with our theoretical framework that comprises of the propositions from the scholarly literature about integration and our operationalisation of cross-sectoral alignment. In Section 3, we present the case study, which is a qualitative analysis of cross-sectoral alignment in Turkish irrigated agriculture. Finally, we close with concluding remarks in Section 4.

2. Theoretical framework

In this section, we first present the theoretical background about integrative ideas in water, land and environmental governance. Then we present a conceptual model of governance, on which the analysis scheme for cross-sectoral alignment is built. After reflecting on how the integrative approaches deal with the wicked nature of cross-sectoral issues, we propose the concept of cross-sectoral alignment and introduce the criteria to analyse it.

2.1. *Integration: the keyword in natural resource governance*

The multitude of aspects regarding the governance of natural resources calls for approaches that transcend the fragmented single-sectoral approaches. In the relevant scholarly literature, integrated approaches to manage water and land resources are favoured since they enable the recognition of political, social and ecological factors by emphasising cross-sectoral and broad stakeholder participation in planning and implementation of policies (Penning de Vries et al., 2003).

The need for the integration of multiple issues and concerns into water management was acknowledged in the second half of twentieth century, whereas integrated water resources management (IWRM) became the dominant paradigm since 2000s (Biswas, 2008). Bossio et al. (2010: 536) argue that ''every land use decision is a water use decision'', and therefore integration cannot be realised without considering the policy-decisions about land resources. The definition of IWRM refers to the need to simultaneously manage water and land (GWP-TAC, 2000). However, neither the definition nor the operationalisation of IWRM incorporates the view of scientific disciplines related to land resources (Biswas, 2008).

A second point of concern about integration is the increasing pressure of policy interventions in different sectors. Without a specific consideration for environmental policies, the concept of policy integration was elaborated as early as 1980 by Underdal (1980), who proposed three requirements for an integrated policy, namely, the *comprehensiveness* of inputs such as the actors, issues and scales; *aggregation* to an overall perspective to process the policy options and to base the policy decisions; and *consistency* of the outputs across different departments and multiple levels of governance. These three requirements apply to IWRM too (Imperial, 2009).

Environmental policy integration (EPI) was proposed in particular for the European Union (EU) policy sectors (Lafferty and Meadowcroft, 2000; see also Jordan and Lenschow (2010) for a review of the EPI-related research). EPI incorporates a normative approach by making environment the core dimension – or the ''principled priority'' – of policy-making, but not the periphery of economic and social sectors (Lafferty and Hovden, 2003: 9).

Knoepfel and Nahrath (2005) suggest that in addition to the policies, the governance regime covers the property rights on the natural resource and hence regime integration becomes the broader goal to pursue within the realm of natural resource governance. The integration level of a resource regime is assessed using two criteria, namely, the *extent*, which is the scope of resource uses recognised by the regime, and *coherence*, which indicates the degree of consistency and coordination within and between policies and property rights (Knoepfel and Nahrath, 2005). The regime approach has the advantage of explicitly dealing with the property rights, which are among the critical issues regarding natural resource governance in general (Poteete et al., 2010), and water governance in particular (Bressers and Kuks, 2004; Kissling-Näf and Kuks, 2004).

2.2. *Cross-sectoral alignment*

Cross-sectoral issues are at the intersection of multiple governance systems and policy sectors. Given this *nexus* nature, it is less likely that applying the comprehensive principles of IWRM and EPI can prove fruitful to analyse these

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