



A misfit in policy to protect Russia's black soil region. An institutional analytical lens applied to the ban on burning of crop residues



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ARTICLE INFO

Keywords:

Degraded black soils
Crop residues burning
Conservation tillage
Social and institutional analysis
Kulunda steppe

ABSTRACT

Russia's region of Chernozem and Kastanozem soils in Western-Siberia, where this study focused on the Kulunda steppe, has great potential as a carbon sink, particularly if the current widespread practice of burning crop residue can be replaced with conservation tillage practices that will return the residue to the soil. Environmentally-oriented land use policy measures have been introduced that could accomplish that goal. But these measures are quite recent, and face obstacles in the prevailing post-socialist institutional environment and in cultural norms.

This paper explores factors influencing implementation effectiveness of policies that support prevention of soil erosion and nutrient loss. We refer to Williamson's four levels of social analysis, and thereby add to it a dynamic component, illuminating the timeframe required for changing the criteria under investigation. A case study in the Kulunda steppe (*Altai krai*) with 24 semi-structured interviews revealed that critical factors affecting soil protection policy implementation exist at all levels of social interaction.

We use one example of a Russian regulatory measure – the ban on crop residue burning – to explore and systematize critical socio-economic, administrative and institutional factors that diminish the impact of such a command-and-control regulation. Credible monitoring and sanctioning to implement the ban turned out to be almost impossible. Farmers' beliefs about the positive effects of burning on the soil could not be changed by short-term administrative regulations, and there are no alternative off-field uses for the residue. This empirical study shows that information provision and subsidies for voluntary conservation tillage practices are likely to be more effective measures to counter soil degradation than the residue-burning ban.

1. Introduction

In the Siberian steppe, in the context of the Virgin Land Campaign during the Khrushchev era in the 1960s, 6.2 million hectares grassland were earmarked for ploughing (Illiger et al., 2014). In the *Altai krai* of South-Western Siberia 2.3 million ha natural steppes were largely transformed into arable land (Durgin, 1962). Its size alone made the whole campaign one of the biggest human-designed land use changes in the world. Land use change from grassland to cropland involves a loss of organic carbon due to smaller residue inputs into the soil plus larger soil organic matter decomposition due to tillage operations (Bischoff et al., 2016).

Our study has been conducted in the Kulunda steppe in the *Altai krai*. Today, this steppe is largely used for farming, and crop residue burning is widespread (Romanenkov et al., 2014). In line with a number of studies that dig into the bio-physical effects of burning on

soils (such as Fernández et al., 2016; Wang et al., 2016), Novara et al. (2011) regard fire as the main contributor to land degradation. Crop residue burning also increases atmospheric pollution because of additional emission of greenhouse gases (Huang et al., 2012; Smil, 1999). A regional NGO, the Gebler Ecological Society, which is one of environmental organizations actively involved in the soil protection and anti-burning campaign in *Altai krai*, points to serious ecological risks that agricultural fires pose for the steppe's fauna. The Gebler organization also cites serious damage to village infrastructures from uncontrolled field fires.

We will show that, in the Russian context, farmers have almost no off-field uses for crop residues. Thus, if they do not burn it, they have to switch to conservation tillage practices. Conservation tillage is defined as a tillage system that leaves enough crop residues (at least 30%) in the field after harvest to protect the soil from erosion (Uri, 1999). Conservation tillage likewise serves the goals of carbon sequestration and

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<http://dx.doi.org/10.1016/j.landusepol.2017.06.018>

Received 24 January 2017; Received in revised form 9 May 2017; Accepted 22 June 2017

Available online 07 July 2017

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soil humus accumulation (Frühauf and Meinel, 2006). It has capacity to reduce severe wind erosion and soil degradation (Lafren et al., 1985; Smil, 1999), both of which are seen as a continuous risk for the Kulunda region (ROSREESTR, 2013). How to facilitate conservation tillage politically – and what local socio-economic and institutional factors caused the ineffectiveness of current soil protection policies – are the questions this paper pursues. We will analyze this with a systematic policy analysis based on the Procedure for Institutional Compatibility Assessment, which focuses on the congruency of formal rules with the prevailing institutional environment. In order to make predictions on the effectiveness of a formal measure, we apply the analytical framework of Williamson's level of social analysis, highlighting different time spans needed to change various formal and informal institutions that should ideally support one another.

There are a number of studies that analyze factors that foster compliance with soil conservation regulation mostly based on economic reasoning. Prager and Posthumus (2010) list belief in positive effect on soil fertility and higher yields, decreased costs, confidence in state-governed programs and authorities, knowledge and awareness of state programs, and flexibility of prescriptions as important in the adoption of conservation tillage practices. As a consequence of the US dust bowl in the 1930s, there are early studies such as the one from Uri (1999) that point out that the factors that impact adoption of conservation technologies are difficult to quantify. Uri (1999) emphasizes farmers' profitability considerations: basically, farmers' perception of a gain in net benefits from switching technologies. The benefit consideration involves not only direct income gains but also adjustment costs such as having to learn new production skills (Uri, 1999). In addition to the many scholars who deal with economic aspects, others such as Schneider et al. (2010) focus on the importance of values and the symbolic meaning of adopting soil conservation practices. Recently, Pereira et al. (2016) show that farmers' perception of the environmental consequences of their actions also has major impact on how they engage with conservation practices and thus, whether and how they follow the relevant legal regulations. Wossink and van Wenum (2003) found that the production environment and familiarity with conservation programs better explained participation in conservation programs than farm characteristics, such as farm size or lack of a successor. Farmers' personal characteristics such as innovativeness could not be proven as decisive for actual participation in conservation practices.

For post-socialist countries, including Russia, Prishchepov et al. (2012) highlight the importance of institutions – mainly differences in land privatization strategies and land markets – in farmers' land use decisions. Studies on the institutional environment of soil protection policies in countries with a comparable post-socialist legacy show a mix of personal, socio-cultural and economic, along with institutional and political, factors that influence behavior in soil conservation efforts (Prager and Posthumus, 2010; Stupak, 2016) and that limit the effectiveness of existing laws (Prager et al., 2011; Prager et al., 2012).

In the Ukraine, for instance, mainly institutional and political factors influence behavior in soil conservation efforts (Stupak, 2016). After destruction of the elaborated soil protection system set up in Soviet times, the authorities did not manage to develop either new sets of sound soil protection rules, or mechanisms to enforce these. In addition, soil monitoring of agricultural land for example, still does not collect information on the rates of wind and water erosion (Stupak, 2016). Another factor typical for post-socialist countries is unclear property rights and duties. Stupak (2016) identifies this for the shelterbelts, which lost their function of soil protection because the task of managing them were not assigned to any actor.

Prager et al. (2012) have shown, for Bulgaria, Czech Republic and the former German Democratic Republic, how farmers' environmental awareness and understanding of relevant soil conservation policies, the perceived trustworthiness of authorities, and limited accessibility of advisory systems are all factors that influence farmer behavior in soil conservation efforts. Likewise, land-use rights and the connection

between landowners and farmer-lessors play a role. Prager et al. (2012) particularly highlight the problem of incoherent policy frameworks for soil conservation, exemplified by overlapping and partly contradictory soil conservation measures, which are neither targeted to a soil specific degradation type nor provided with appropriate enforcement mechanisms, limiting the effectiveness of existing laws. Another social factor is peer pressure, when fields are perceived to look messy under conservation tillage (Prager et al., 2012).

In general, institutions – both formal and informal – play a significant role in supporting land use changes towards better environmental quality. Russia largely follows a formal command-and-control policy approach. The Kulunda example of a recent policy measure that simply, and quite ineffectively, banned the burning of crop residue on agricultural and forest land demonstrates how such an approach creates a misfit between the policy and the prevailing social and institutional context. The crucial factors that facilitated or hampered the implementation of this measure can inform assessment of efficacy and cost-efficiency of any similar proposed command-and-control policy measures and thus provide policy guidance. Such an analysis can further stimulate policy-makers and regional administrators to initiate ex-ante evaluation of future measures, a strategy still rather seldom undertaken in the Russian context.

The paper is organized as follows. Chapter 2 introduces the case study area, outlines the extent of burning of crop residues in Russia and presents the promulgation of the policy aiming to ban it. Further, Chapter 2 elaborates on the analytical framework and theoretical concepts employed, and finally describes the data collection. Chapter 3 presents the results, the empirically-based ranking of institutional aspects leading to ineffective policy implementation, and an ordering and discussion of these crucial institutional aspects according to Williamson's level of social analysis. In the discussion and conclusion, Chapter 4, selected aspects such as deeply rooted beliefs about the presumed advantage of residue burning – beliefs which take very long to change requiring considerable advisory work and educational reforms – are contrasted to aspects such as adjustment costs of farmers which can easily be addressed in the short-term with compensation measures.

2. Methods and conceptual framework

2.1. The Kulunda steppe in Altai Krai

The *Altai krai*, which represents an administrative unit in the Russian Federation, covers some 16.8 mio hectare, of which 11.6 mio hectare are classified as agricultural land (56% arable land and 32% pastures) (ROSREESTR, 2013). The study area – the semi-arid Kulunda steppe in *Altai krai* (see Fig. 1) – stretches over an area of approximately 8.6 million hectares, with 6.7 million hectares agricultural land (ROSREESTR, 2013). Cultivation in the Kulunda region began in 19th century, but in the 1950's and 1960's- in line with the Soviet production-oriented policy – ploughing of the steppe land and massive cash crop cultivation was initiated, in what was known as the Virgin Land Campaign (Durgin, 1962). Notably, in the development history of the Kulunda region in Soviet times and after (collectivization, village resettlement, production orientation), all change has been implemented by regulatory policy instruments (Wegren, 2013).

Since 1991, the *Altai krai* has followed the federal privatization reforms. Land and asset shares of former collectives (*kokhazes*) and state farms (*sovkhozes*), have been redistributed initially in ideal shares¹ to eligible persons. During the early years of reform, local authorities tried to keep individuals from withdrawing their newly-distributed share of the collective property. Therefore, all through the 1990s, agricultural

¹ Ideal land shares mean there are no recognized borders yet, where your actual plot of land is.

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