1. Introduction

The paper by Hugh Ward discussed in the following investigates how the states' embeddedness in the general international system and in the environmental regime network affects the effectiveness of environmental regimes. In contrast to many others in the field of global environmental politics (cf. Bernauer 2013), he does not aim at explaining the cooperation behaviour of states at the international level but sheds light on one of its possible consequences. More precisely, Ward (2006) looks at political network effects on the actual outcome of environmental politics. In order to do so, he combines social network analysis with ordinary least square (OLS) regression analysis and finds that countries strongly cooperating – and hence more central to the environmental regime network – act more sustainable. After summarizing his theoretical argument and elaborating the concepts and method used (Paragraph 2 and 3), I indicate strengths and limitations of his approach (Paragraph 4). Based on this assessment, I outline possibilities for future research and conclude (Paragraph 5).

2. Theoretical Argument

Ward (2006) positions himself in the context of the literature on the Kantian Peace, claiming to provide further insights on the role of intergovernmental organizations (IGOs) – one cornerstones of the triangle of international peace. This claim is based on the argument that cooperation in IGOs fosters sustainability while sustainability in turn indirectly prevents conflict outbreak over resource scarcity, migration etc. Yet, this paper deals only with one element of this path, i. e. the effect of IGOs on sustainability. The author asks whether the international network of environmental regimes overall promotes sustainability, having in mind that single regimes might also have negative side effects.

When developing an answer to this question, Ward (2006: 150 f.) builds on assumptions of neo-liberal institutionalism and constructivism. Accordingly, he assumes on the one hand that states become increasingly interdependent, can gain from cooperation use e.g. regimes to overcome collective action problems. On the other hand, regimes are considered to shape informal rules, norms, and mutual understanding. Single regimes are supposed to be embedded in a larger network of regimes, thereby enabling discourse, concepts, and institutional arrangements to travel across regimes. This exchange is also driven by NGOs, business actors, and scientific networks.

Based on this, Ward (2006: 151) argues that nations more central within the regime network are more effective in providing environmental sustainability because of their increased social capital in this position. Social capital advances compliance with environmental requirements through interconnectedness, trust, and formal as well as informal norms. Most importantly, interconnectedness fosters mutual expectations, information flows, communication; enables sanctioning and bribing through issue-linkage. Additionally, the environmental regime network is itself embedded in the general international system, functioning in a similar manner.

Given that the author's expectation is met – the more central a country is the more sustainable it is – this is interpreted as a sign that the regime network as such is effective. Looking directly at separate regimes would not be sufficient due to possible side effects. In the next paragraph, I outline how the author proceeds to test the proposed relation between centrality and sustainability.

3. Conceptualization, Method, and Findings

To analyse the relationship between the independent variable regime centrality and the dependent variable effectiveness of the environmental regime network, i. e. the states' sustainability, Ward (2006) applies social network analysis in order to determine the centrality of a state and OLS regression to estimate the effect of centrality and other explanatory factors on sustainability.

He conceptualizes centrality in the regime network in two ways by looking at, firstly, ratified treaties, and, secondly, membership in IGOs dealing with environmental functions (Ward 2006: 152 f.). Using social network analysis, a centrality measure is derived by assigning the countries undirected links with other countries based on shared treaties or organization memberships respectively. These links are weighted depending on the number of common treaties / memberships and regime centrality follows as the sum of the values of all links. In the same manner, general system centrality is calculated based on the membership in any kind of IGO (Ward 2006: 154). The centrality measures are included separately in the models because they are highly correlated with each other.

To capture the effectiveness of the environmental network, the author concentrates on its ability to motivate sustainable behaviour within the states. Ward (2006: 155) uses four different measures of sustainability: two derived from a factor analysis of 46 indicators of

environmental quality and development, the average footprint of a national citizen[1], and the genuine saving rate. Due to data availability, the data set is cross-sectional and the models include between 114 and 130 countries.

The four sustainability measures are used in four separate OLS models also including various control variables, selected through a testing down approach. Controls are for example democracy, income per capita – to account for the Environmental Kuznets Curve –, domestic regulation capacity, and trade as percentage of GDP. Furthermore, he tries to encounter potential problems of reverse causality by using three stage least squares (Ward 2006: 158; 161).

Overall, the analysis is supporting his expectations, showing for all four measures of sustainability that countries more central to the regime and/or general network are more likely to act sustainable though the effect size of the latter is larger. Hence, environmental regimes would have an overall positive effect even if some have negative side effects. The direct effect of democracy on sustainability is ambiguous depending on the sustainability indicator. However, Ward (2006: 161) finds at least an indirect positive effect because democracies are more likely to be central to the regime system. The effect of income per capita is non-linear as the Environmental Kuznets Curve (EKC) assumes it. Having said this, these results need to be considered with caution since especially the conceptualization faces some shortcomings as it will be shown in the following.

4. Strengths and Limitations

Ward (2006) contributes to the study of global environmental politics in three ways. Firstly, he is able to show that the national-level implementation of international agreements is influenced by the current shape of the international and environmental regime system. Secondly, he applies a sophisticated measure to localize countries within the international system going beyond the mere number of commitments. Thirdly, the findings are of high policy relevance since the author claims to corroborate the optimistic view that international cooperation in environmental politics is indeed improving the situation, irrespective of negative externalities of single regimes.

Nonetheless, the relevance of his findings depends on their validity and limitations with respect to the theoretical claims, the conceptualization, and statistical model specification

[1] Footprint defined as the area in hectares that is necessary to sustain the lifestyle of an average citizen of a nation (Ward 2006: 156).

need to be kept in mind. Primarily, the author makes theoretical claims he is not testing in his analysis: firstly, he does not gain any insights in the causal mechanism he proposes. After developing the quite interesting social capital argument, it remains an un-tested assumption. Do links via treaties and organization indeed increase information flows, communication, and trust?[2] Secondly, he positions himself in the tradition of the Kantian Peace without scrutinizing the second part of the Kantian Peace argument – sustainability prevents conflict - at all. Though it is not per se objectionable to consider broader socioeconomic consequences of empirical findings, this seems excessive to me.

Regarding the conceptualization, it might diminish the discriminatory power of the treaty measure of regime centrality and general centrality that Ward (2006: 152) also included treaties that do not have environmental issues among their central concerns but have some environmental implications. Consequently, it is not surprising that both measures are highly correlated and show similar effects. Problematic is also that he does not define its criterion of "implications" and it remains unclear how broad it is. Concerning the IGOs measure of regime centrality, the author excludes UN agencies. This might bias his results since countries especially active in the UN might be reluctant to join additional organizations. Additionally, the conceptualization of domestic environmental regulation capacity remains non-transparent. Ward (2006: 160) states that the measure was obtained by "adding a number of variables relating to quality of environmental regulation". While quality is not the same as capacity and it is not elaborated what quality means in this context, the variables included here are mentioned neither in the appendix nor in the replication data.

Yet, the most problematic conceptualization is the dependent variable. It needs to be remembered that Ward (2006: 154) wants to assess effectiveness, not static sustainability. As he states explicitly effectiveness is a regime's *impact on the problem.* But the application of a static sustainability measure as an indicator for effectiveness cannot capture improvements in the situation of a country. We simply do not know whether a country shows a current level of sustainability because it improved / deteriorated / remained equal and hence a statement on the impact is not feasible. Furthermore, he concludes from national sustainability on overall regime effectiveness but it is questionable to measure a transnational phenomenon with a national indicator. Having said this, the sustainable measures also bear some issues: the factor

[2] This is similar to the author's paper published on trade networks and the Kantian Peace: communication flows are here unquestioned assumed to be proportionally related to trade flows (Dorussen/ Ward 2010).

analysis is quite opaque because it is not clear which indicators are included in which factor and it is not justified why four factor are chosen for the analysis. In addition, the factor measures of sustainability, i. e. the dependent variables, stem from an earlier point in time than the independent variables. While the centrality data is from 2002, the indicators used for the factors "are measured as close to 2002 as the available sources allow, but some figures are not fully up to date" (Ward 2006: 156). This increases the problem of reverse causality since it might be the case that countries already sustainable are later especially engaged in the regime network because complying is easier for them. Using the average footprint per citizen faces the difficulty that most poor, agrarian states will be considered sustainable though it seems unlikely that this is due to their central position in the regime network.

With regard to the statistical model specification I see the flaw that it is not theory- but data-driven. The control variables are excluded if they do not have a significant effect without reflecting why they are significant for some measures of sustainability but not for all. The different measures of regime centrality were similarly chosen without reflecting theoretical implications. When interpreting the model results, Ward (2006: 160 f.) does not report the effect size, leave alone predicted probabilities. Though network centrality seems to have a significant effect on sustainability it remains unclear whether this effect is substantial and hence relevant. But despite of the limitations elaborated above, the argument of social capital as driver for effective environmental politics and the social network approach are promising and worth being topic of further research.

5. Future Research

Corresponding the limitations, future research should focus on the scrutinizing the underlying theoretical assumptions, improve the conceptualization of the variables, and take factors into account that are not considered yet. A quite obvious next step is to shed light on the causal mechanism proposed by Ward (2006). Since concepts like trust or information flows are difficult to capture in a quantitative study qualitative case studies seem appropriate. Here it would be quite interesting to disentangle the elements of social capital. An open question is whether the effect of centrality is mainly due to increased communication/information or because formal and informal norms are more strictly followed. Further insights also are needed on the role of non-state actors whose importance has already been stressed by Ward (2006: 150). So far missing from his theoretical model are unilateral actions of environmental protection although his idea of social capital seems very promising for explaining the

compliance with informal norms and expectations, and the perception of urgency of such regulations.

It also remains unclear theoretically how the significant difference in the effect size of general system and regime system centrality can be explained: through which mechanism influences the international system embeddedness the effectiveness of environmental regimes? Here, the results of Bernauer et al. (2010) should be borne in mind, postulating that international linkages have a positive effect on future cooperation. Also, Ward's method should be applied to other regime networks and policy areas to investigate whether the general system has such a strong effect here as well. Moreover, it might be useful to take the integration in the international economic system into account. Although Ward (2006) controlled for trade, it seems interesting to conduct a social network analysis here as well.

Regarding improvements of Ward's approach, the most urgent issue seems the conceptualization of effectiveness. It might helpful to apply more simple concepts of environmental quality to be able to use times-series to indeed measure the impact. For example, Bättig/ Bernauer (2009) use emission *trends* of SO_2. When using the footprint measure it might be interesting to see whether a footprint including the consumption of resources used during the production abroad alters the results. To tackle the reverse causality problem, in a first step the independent variable should be measured at a point in time before the dependent variables. Furthermore, I am confident that the statistical techniques developed in the last eleven years enabling a more sophisticated treatment. Regarding the network analysis, it should be considered to also include indirect links to receive an even more exact picture of centrality.

To sum up, Ward (2006) presented an interesting argument how the environmental regime network can influence via social capital the state's ambitions to meet sustainability standards. Even though the mechanism remains untested, he finds a correlation with centrality for all four different measures of sustainability, indicating that he can indeed capture an underlying relationship. However, why this relationship emerges and whether it is indeed not running in the opposite direction awaits further research.

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