

# Study on the Flexibility in Cross-Border Water Resources Cooperation Governance

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**Abstract.** Flexible strategy is very important to cross-border cooperation in international rivers water resources, which may be employed to reconcile contradictions and ease conflicts. Flexible characters of cross-border cooperation in international rivers water resources could be analyzed and revealed, using flexible strategic management framework, by taking international cooperation protocols related to water from Transboundary Freshwater Disputes Database (TFDD) as samples from the number of cooperation issues, the amount of management layers and regulator agencies in cooperation organization and the categories of income (cost) distribution (allocation) mode. The research demonstrates that there are some flexible features of cross-border cooperation in international rivers water resources: Riparian countries would select relative diversification strategies related to water, tend to construct a flexible cooperation organization featured with moderate hierarchies from vertical perspective and simplified administrations from horizontal perspective, and adopt selective inducement modes to respect 'joint and several liability'.

## 1. Introduction

In international politics, 'flexibility', an elementary strategy to coordinate interests conflict, is constantly utilized in diplomacy policies to alleviate cross-border environment conflict, especially water conflict<sup>[1]</sup>. World Water Development Report (2003) articulates that, most of the basin countries prefer to solve water resource disputes via 'flexible communication', other than extreme measures (i.e. water war)<sup>[2]</sup>. Therefore, as the upstream country of multiple important international rivers, China should properly apply flexible elements to cooperation mechanisms, on the basis of specific cooperation environments (i.e. river basin water environment, historic conditions, basin countries' characteristics). On the one side, Chinese government should gingerly determine the combinations of flexible cooperation strategies; on the other side, they should consider constructing targeted incentive and restraint mechanisms, in order to maintain 'flexible balance' between the rights and obligations of related countries.

Cross-border water cooperation treaties intensively reflect the strategic purposes, actions and directions of water basin countries in their cross-border water resources cooperation<sup>[3]</sup>. Therefore, this paper analyses cross-border water resource cooperate treaties to reveal the flexibility trait in cross-border water resource cooperative governance.

## 2. Research Framework and Data

### 2.1. Research Framework



Research on strategic management paradigm has shifted from a rigid perspective to a flexible perspective under the uncertain dynamic environment. In flexible organizations, strategic selection, institution and organizational structure fit each other and keep harmonious, meanwhile, the extent of how selected strategy and administrative mechanism (administrative institution and organizational structure) fit will greatly influence organizational performance<sup>[4]</sup>. Drawn on institutional-based view, Mike Peng constructs a flexible strategic management paradigm, which is ‘strategic selection—organization--institutional’<sup>[5]</sup>. Based on Peng’s paradigm, we construct the strategic management analysis framework in cross-order water cooperative governance flexibility (Figure1).

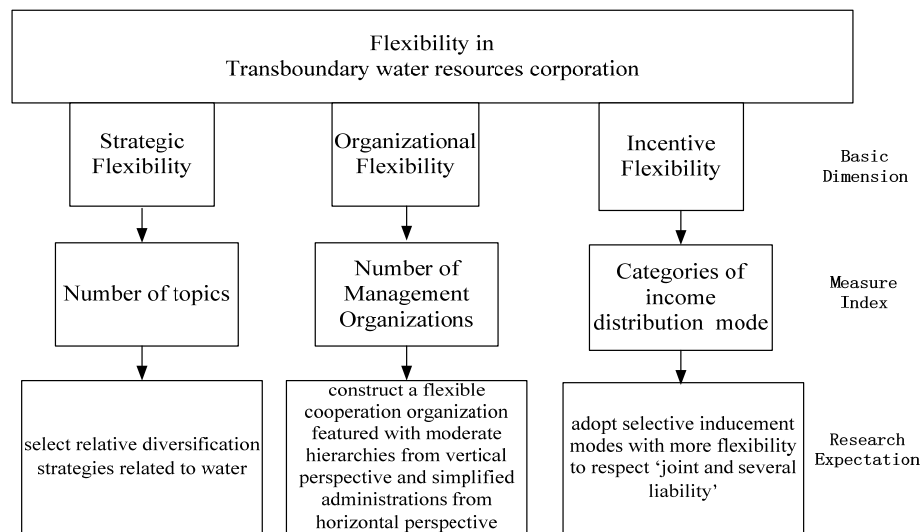
Cooperation strategy flexibility refers to capabilities that cooperation actors could proactively adapt to environment uncertainty via adjusting their optional action targets and strategic action range. The more optional action targets and the wider action range they possess, the higher cooperation strategy flexibility is, and the easier to achieve the dynamic conversion of organizational resource's optimal fits. Therefore, following Roca-Puing et al.’s work<sup>[6]</sup>, we measure the strategic flexibility of cross-border water resource cooperative governance in the amount of basin cooperation treaties (action range).

Cooperative organization flexibility refers to sustainable capabilities that cooperation organizations can cope with external environment change and cooperation strategic conversion, via responsive and adaptive adjustment on processes and structures. Therefore, draw on Li et al.’s indicators<sup>[7]</sup>, we measure the organization flexibility in cross-border water resource governance from vertical and horizontal directions, based on the amount of managerial hierarchy and institutions in river basin water-related cooperation agents.

Cooperative incentive flexibility is a sort of institutional arrangements, which stimulates cooperative agents’ inner motivations to achieve the strategic targets of cross-unit cooperation, by in-time, rational and economic targeted incentives on those actions that benefit cooperation, on the basis on cooperation agents’ rational demand preferences, development stages and contributions to strategic targets. Therefore, following Qaddumi’s work<sup>[8]</sup>, we employ cooperation benefit allocation mode to measure the incentive flexibility in cross-border water resources cooperation. The equal distribution of benefits (costs) reflects institutional rigidity while selective incentive mode is a sort of flexible ‘Institutional Incentives’.

## 2.2. Data collection

Our data mainly come from Trans-boundary Freshwater Dispute Database (hereafter, TFDD), which is maintained by Oregon State University and records those historic water events since 1820s. So far, TFDD has recorded over 450 international water-related treaties. After processing, we finally select 282 trans-boundary water resource cooperation treaties as our research samples, including 140 cross-border river treaties, 83 border river treaties and 59 treaties which involve both.



**Figure 1.** Content analysis framework of flexibility in transboundary water resources cooperation governance based on strategic management

### 3. Analysis on Flexibility Character

#### 3.1 Strategic Flexibility Character

Strategic flexibility is a sort of stimulating factors that makes the implementation of strategic change easier. Strategic flexibility usually facilitates the basin countries to adopt sharing mode, making them exchange resources and extend the range of sharable resources, enabling them alter cooperation strategies swiftly and cost-efficiently, and finally providing them more options to cope with external environmental variations. Flexible strategy with diversified selections can benefit the exploitation of cooperation fields among basin countries, extending from single water-related topics to the other water-related topics, which is called ‘related diversification strategy’. On one hand, flexible strategy can suppress ‘free-rider’ actions; one the other hand, it will facilitate economies of scale and scope in water-related public goods supply. Based upon constructing fully mutual trust, basin countries employ strategic flexibility to alter resource’s potential use, introduce non water-related topics (a.k.a. non-related diversification strategy), expand cooperation scope and escalate cooperation level. Therefore, flexible diversification strategy involves water-related and non-water-related topics, normal political topics and sensitive political topics, thereby increasing diplomatic leeway in cross-border water resource cooperation and obtaining ‘win-win’ consequences.

We extract 1424 cooperation topics from 287 international water-related treaties, each treaty contains approximately 4.96 cooperation topics, which is close to multiple level. Approximately 55% of those treaties contain 5 or more topics, 17% of them only involve one topic, and the rest of them involve 2-4 topics each. In the meantime, according to the relevance of those topics, the international river resource cross-border cooperative strategies could be divided into four categories: ①single water-related topic, which is specialized strategy; ②multiple water-related topic, which is related diversification strategy; ③multiple non-water-related topic, which is non-related diversification strategy; ④topic involve both of water-related and non-water-related, which is mixed diversification strategy. Wang et al argue that diversification strategy belongs to the continuum of flexible behaviors<sup>[9]</sup>. According to statistical data, the basin countries prefer to choose flexible strategies, which mainly consist of related diversification strategy and mixed diversification strategy. In those treaties, about 43% take related diversification strategy, about 38% treaties take mixed diversification

strategies, the total percentage of treaties that take specialized strategy or non-related diversification strategy is less than 20%. Diversification strategy is a dynamic water paradigm<sup>[10]</sup>, which emphasizes the perspective of whole river basin in cooperation among countries and the relevance of basin resource element, and reflects the comprehensive change of social cognitions on potential river basin risk.

### 3.2 Organizational Flexibility Character

In an uncertain dynamic environment, flexibility is the elementary trait of successful organizations<sup>[11]</sup>. The influences of organizational flexibility on cross-border could be articulated from the following three aspects: ①Organizational flexibility enables decision makers to precisely seize the temporal pace, observe cooperation situations more acutely, thereby adjusting cooperation strategy timely, formulating proper organization forms, coping with uncertainty rapidly, solving disputes and conflicts, maintaining and enlarging cooperation results. ②Information diffusion in flexible organizations is more fluent, which benefits the communication and coordination among member countries, helping them form comprehensive and clear understanding towards the directions and targets of strategic adjustments. Kolodny et al argue that successful organizations close to flat structure<sup>[12]</sup>. ③Flexible organizations could rapidly select experts and officials from basin countries, establish cross-field and cross-function work team. By integrating dispersed information resource, the organization could make the targeted solution to those specific problems and cooperation targets within the authorization of basin countries, in the shortest time.

Basin cooperation organizations are the derivatives of hierarchical governance structure in basin countries and possess adaptive organization forms, which usually involve operation level, tactic level, and strategy level<sup>[13]</sup>. In operation level, flexibility refers to the capability that organization can coordinate the ordinary water-related affairs; In the tactic level, flexibility is the capability that organization can adapt themselves to mid-term basin water resource cooperation planning adjustment. In strategy level, flexibility is the capability that organizations can accommodate the adjustment of long-term cooperation strategy. Therefore, in border areas which are usually uncertain, flexible organizations are the important platforms for international river water resource cross-border cooperation, due to its trait of moderate hierarchy, concise structure, agile reaction and fluent communication.

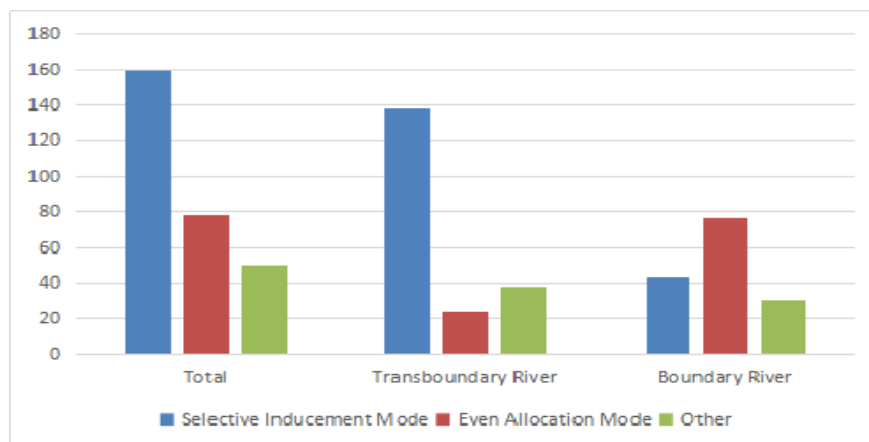
In our sample, almost 74% treaties choose to establish permanent work institutions to process international river affairs, about 68% adopt the organizational forms that contain 2-3 hierarchies and 3-5 institutions, formulating multi-level elastic governance mode, including Council of Ministers, which is responsible for making and adjusting the united planning of cross-border water usage and protection, coordinating major water-related projects along basin-wide, belongs to basin strategy level. Secretariat or Working Groups, which are responsible for general water-related affairs and implementing detailed water-related cooperation project, belongs to operation level. Technical committee provides United Committee the professional consultation about the feasibility of basin water-related projects, which is responsible for aiding decision-making.

### 3.3 Incentive Flexibility Character

Flexible cooperation treaties focus on compensation mechanism, providing elastic risk-benefit allocation cooperation framework, can adjust risk strategy based on cooperation situation<sup>[14]</sup>, which can stimulate cooperation participants better. In the game, benefit (cost) sharing institutions strengthen cooperation incentives via remodeling cost-benefit structure in those countries. Flexibility incentives more consider the individual variance, diversifications of benefits demands and adaptation to the external environment. In cross-border public problems, incentive flexibility could provide individual basin country extra non-collective revenue, compensating its cost in engaging collective actions, other than international public benefits. Therefore, incentive flexibility mode can benefit to the rational allocation of cost and benefits among basin countries. From the perspective of benefit-cost sharing model, 56% treaties adopt selective incentive mode, 27% adopt even allocation model; the rest treaties

adopt the other modes. It is obvious that selective incentive mode is the mainstream in cross-border water resource cooperation, which better reflects the ideology of 'joint but different liability'.

The geo-structure of watersheds is an important factor that affects the cooperation and management of trans-border water resources. Therefore, we analyze the incentive model together with river types (Figure 2). The data shows that the inter-basin river basin countries tend to adopt a more flexible and selective incentive model with more choices of evenly distributed (share) benefit (cost) mode among border river basins. In the cross-border cooperation of international river water resources, the asymmetric interdependence caused by the geopolitical position between the upstream and downstream countries makes it easier for the downstream countries to obtain one-way external benefits. The flexible incentive mode can provide upstream countries with special incentives to transform their strategic advantages derived from favorable terrain into actual benefits, thereby boosting the enthusiasm of the upstream countries in actively participating in the asymmetric cooperation.



**Figure 2.** The distribution of income distribution mode in transboundary water resources cooperation governance

#### 4. Conclusion and implication

In this paper, we revealed the flexible characters of cross-border water resources cooperation governance. In the future, we will perfect China's cooperation policies from the aspects of strategy, organization and incentive system according to the characters of different regions' international rivers in the future.

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