

From open sewer to salmon run: lessons from the Rhine water quality regime

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Abstract

The international regime for the River Rhine is widely considered to be unique. In this article, the author draws some lessons from the regime's development. These are related to two distinct strands in the literature. The first can be summarized under the heading of regime theory. It comprises studies dealing with the development of international regimes concerning water quality. These studies view the evolution of any such regime as determined by features of the issues in the light of relevant societal values and the role of transnational interest groups, scientific analysis and progress and the potential for interstate interaction. The second strand comprises aspects of negotiation theory. Its relevance suggests that there are options for trade-offs and that those options can have a positive impact. In addition, this literature helps to identify tactics that may be available to the negotiating parties.

Most of these factors have had a positive impact. On the basis of an analysis of the historical development of the Rhine regime, this study elaborates upon three conditions that have had a positive impact on the development of the regime: the presence of an alert, creative and convincing party downstream; the existence of good international relations throughout the catchment area; and the presence of an international river commission, which could generate and disseminate information as well as facilitate negotiations among the riparian states. © 1999 Elsevier Science Ltd. All rights reserved.

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1. The current Rhine water quality regime

Conflicts over water are often international in nature. Throughout history, geophysical features have generally been ignored in the process of delineating the borders of nation-states. Thus, conflicts over water have long featured on the international political agenda. The expressed goal of international consultations is the creation of international regimes. In order to steer conflicts over water in a constructive direction, structures for consultation must be set up. These must be geared to the task of creating unanimity on desirable principles, as well as clarity on the rights and obligations of the states concerned. Regimes vary with respect to the extent to which they are legally binding, their level of comprehensiveness, their specificity and the level of their ambitions. With respect to these criteria, the Rhine regime is obviously a unique and progressive regime.

The juridical nature of the regime — that is, its potential to enforce agreements — depends largely on what kind of actors have come on board. The most robust agreements — that is, those that can in principle be enforced through an appeal to the courts — include directives promulgated by the European Commission as well as treaties among states. Treaties derive their coercive power from having been ratified by representative bodies. If no formal ratification procedure has been applied, they are ‘only’ politically binding. The current Rhine regime consists of three legally enforceable treaties. The Treaty of Bern (1963) provides the legal foundation to support the work of the International Rhine Commission (IRC). The Rhine Salt Treaty and the Rhine Chemicals Treaty consist of protocols for decreasing of the level of pollution in the river. Similar agreements are found in the Rhine Action Program (RAP), which incidentally has not been formally ratified by the riparian states (the Netherlands, Germany, France, Luxembourg and Switzerland). The agreements reached in the context of the RAP will have a more binding status, if the new Treaty for the Protection of the Rhine (1998) enters into force.

Comprehensiveness and specificity of a regime are often incompatible. Comprehensiveness refers to the number of activities being regulated, while specificity concerns the level of detail of the prescribed behavior. Comprehensive regimes tend to be rather abstract. Regimes that consist solely of principles are often comprehensive in the sense that they may apply to many activities. At the same time, however, they are generally not sufficiently concrete and leave too many loose ends; they hardly exclude any options for action. A more specific regime contains concrete norms and clear codes of conduct. These standards have to be defined in terms of rights and obligations of the states concerned. Also decision-making procedures can be classified in terms of their specificity and comprehensiveness. Apart from defining which voting procedures should apply (commonly including the requirement of unanimity), a regime may contain details on the role of the secretariat, the frequency of interaction, obligations for information exchange and rules for arbitration. Compared to other international agreements, the Rhine Treaties and the RAP are very comprehensive and specific. The Treaty of Bern sets forth the formal mandate of the IRC. This treaty describes the powers of the IRC, its composition and the procedures to reach decisions. The Rhine Salt Treaty contains the agreement that the French potassium mines have to calibrate their discharge of chloride to the number of cubic meters of water per second crossing the Dutch border (the debit), as well as the measures to be taken in the Netherlands to decrease the nuisance caused by the discharged

chloride. The Rhine Chemicals Treaty aims to terminate or limit the discharge of substances that appear on the so-called ‘black’ and ‘gray’ lists. On the basis of this treaty, the riparian states must continue to negotiate specific restrictions on the discharge of waste materials.

Regimes may also be classified on the basis of their level of ambition. A regime that consists merely of a formal decision-making procedure is not a very ambitious one. It can hardly be expected to lead to much improvement in the situation. However, if the goals that have been formulated call for a change in the current conditions, its level of ambition is higher. Especially due to the goals formulated for the RAP, the Rhine regime is considered to have a high level of ambition. Through the RAP, the states along the Rhine strive to realize nothing less than the ecological recovery of the river. The RAP envisioned that previously indigenous species such as the salmon would return to the waters in the catchment area of the river by the magic year 2000. To this end, the riparian states have agreed to achieve a reduction by at least half of river’s load of heavy metals, organic micropollutants and substances promoting eutrophication (fertilizers). Ecological recovery involves not only reducing the level of pollution, but also building fish ladders at dams and improving the spawning conditions for salmon.

To explain the particular development of the Rhine regime, inspiration may be found in two sets of theoretical insights: regime theory and negotiation theory.

2. Regime and negotiation theory

The development of regimes for the management of natural resources can be studied from a range of perspectives. Osherenko and Young (1993) as well as Vogler (1995) have outlined the perspectives on regime theory. They have sought explanations for the development of regimes in the existing international balance of power, in clashes among the interests of states, and in differences in the level of knowledge. Especially the latter two approaches have been elaborated in studies dealing specifically with the development of regimes for transboundary water pollution¹. These studies have yielded the insight that a range of factors may promote the development of regimes.

First of all, some studies have shown that the chances for the development of a regime increase if problems occur in several places within the catchment area of a river (LeMarquand, 1977; List, 1990). The chances also increase if a crisis occurs. The symmetry of the problem increases under such conditions. The chances for the development of a regime also improve if the values that are expressed in the riparian states emphasize the importance of the quality of the environment (Saetevik, 1988) and if environmental organizations grow in professionalism and expand their international activities (Wettestad, 1980). In addition, it is assumed that the potential for regime development will grow as more is known about aspects of water quality and as a multidisciplinary and influential international community of experts is cultivated

¹ These studies vary by design and size. The studies by LeMarquand (1977) and Spencer et al. (1981) each covered several transboundary water systems. Mingst (1981) and Linnerooth (1990) deal with a single regime, i.e. that of the Rhine and the Danube, respectively. Spekrijse (1989) discusses the options to develop regimes for transboundary water bodies at a subnational level. The development of the regimes for the North Sea, the Mediterranean and the Baltic Sea are analyzed by Saetevik (1988), Haas (1990), and List (1990), respectively.

Table 1
Highlights from the history of the Rhine regime

1950	informal consultations on the water quality of the Rhine
1963	agreement on the establishment of the International Commission to Protect the Rhine from Pollution (the Treaty of Bern)
1969	spill of endosulfan
1972	first Ministerial Conference of the Rhine riparian states
1976	Rhine Chemicals and Salt treaties; endorsement by the European Commission
1979	France refuses to ratify the Rhine Salt Treaty
1985	ratification of the Rhine Salt Treaty
1986	Sandoz spill disaster
1987	Rhine Action Program
1991	supplementary protocol concerning the Rhine Salt Treaty
1995	floods
1998	new Treaty for the Protection of the Rhine

(Haas, 1990; Mingst, 1981). Moreover, the increase of multifaceted contacts in other fields among the states involved is supposed to promote the development of regimes. A similar effect may result from the growing experience with like problems elsewhere (List, 1990). Finally, there are suggestions in the literature on regime theory that the development of a regime may be promoted by expanding opportunities for an intergovernmental body to assume a facilitating role (Linnerooth, 1990; Spencer, Kirton & Nossal, 1981).

The literature on water regimes largely ignores the question of how negotiations are actually conducted. This gap is filled by contributions to the more empirically oriented literature on negotiations, such as the standard works by Fisher, Ury and Patton (1983), Susskind and Cruikshank (1987) and Ritsema van Eck and Huguenin (1993). Throughout the literature, there is a resounding plea for integrative rather than divisive negotiations. The characteristic difference between these two ideal-typical formats lies in the strong emphasis on satisfying mutual interests when a settlement is reached in negotiations of the integrative type. In divisive negotiations, the parties tend to dig themselves in on positions from which they are very reluctant to move. Integrative negotiations have characteristics of cooperation toward a shared goal, while divisive negotiations look more like a fight to defend particularistic claims.

On the basis of the body of literature on negotiations, it may be posed — first and foremost — that the more trade-offs the parties can identify, the better the chance of a successful development of a regime. Moreover, the literature suggests that the conversion of a divisive strategy into an integrative approach may benefit the negotiations. This can be achieved by adopting integrative tactics. One such tactic is to separate the divisive from the integrative topics on the agenda for the meetings. Another is to form broadly based delegations to the negotiations. Yet another is to schedule informal and open brainstorming sessions, in which all the expressed interests of all the parties are treated as part of the problem to be resolved. The list of integrative tactics also includes the introduction of ‘objective benchmarks’ into the negotiation process. Information supplied by reputable scientific institutions could form a point of reference. Or norms prevailing in countries other than those of the negotiating parties might serve as such ‘objective benchmarks’. The intention to conclude the negotiations with stipulations that should prevent the occurrence of ‘free riders’ — the so-called contingencies or

self-enforcing clauses — is also counted as part of a tactic to enhance integration, which might have a positive effect on the development of a regime. Moreover, the negotiation literature suggests that the chance of actually developing a regime is positively affected when the people involved get along with each other. Another suggestion is that the involvement of a mediator could stimulate the development of a regime.

3. Progress and stalemates in the development of the Rhine regime

Insights of both regime and negotiation theory can be applied to explain the development of the Rhine regime. In Table 1 we have summarized the highlights from the history of the regime. The negotiations between the governments of the riparian states resulted gradually in structures for consult, principles concerning water quality and more specific obligations.

In the development of the Rhine regime five turning points can be identified. These points marked the beginning of a new trend in the development of the regime (Kay & Jacobson, 1985; Leemans, Geers & van Grinsven, 1983; Teisman, 1992). In the periods between these turning points, changes were made in the legal status, the comprehensiveness, the level of specificity and/or the ambitions of the regime.

The first turning point was marked by the onset of a trend toward greater comprehensiveness of the regime. Concretely, it consisted of a Dutch and Swiss initiative in 1949 to create an informal consultative body. Its legal character changed when this body obtained a formal status in 1963 through the Treaty of Bern. The first time a ministerial conference of the riparian states convened — in 1972 — marked a further strengthening of the legal status. This is the third turning point in the development of the Rhine regime. The fourth turning point was reached in 1976 when the Rhine Treaties were concluded. These treaties specified the ways to deal with the chloride and chemical pollution.

After that, it took 10 more years for the regime to move forward any further. This is why the period 1976–1986 can be characterized as a period of unresolved issues. The quagmire consisted of issues pertaining both to the Rhine Salt Treaty and to the Rhine Chemicals Treaty. The negotiations on the Rhine Salt Treaty had to start all over again. Eventually, they did produce some changes in the treaty, though only marginal ones. The results of the efforts to elaborate the Rhine Chemicals Treaty to include substance-specific emission norms remained very modest too. Only a few of the IRC recommendations actually became binding. After 1986, however, the stalemates were resolved. The Rhine Action Program has since led to a comprehensive and ambitious regime. The differences over the salt emissions were also resolved during this period. The Rhine Salt Treaty was specified in a protocol. The involvement of the ICPR with ecological recovery and flood protection was formally approved by the new Treaty on the Protection of the Rhine. This treaty replaces the Treaty of Bern and the Rhine Chemicals Treaty. This meant that, once more, there was progress in the regime development.

4. Problem characteristics and regime development

The issue of the quality of water in the Rhine catchment area has always shown both symmetric and asymmetric features.

Throughout almost the entire catchment area, the urban population has had to deal with bad-tasting drinking water, sicknesses (in Rotterdam, the Ruhr area, and Zürich), and massive attrition of fish (at Nürnberg, in the Main River and in the surroundings of Amsterdam). Migrating species such as the once-abundant salmon had already disappeared from the catchment area by the onset of World War II. During the postwar economic boom, the problems only got worse. The bad taste of the fish and the drinking water was noticed in several places in Germany. In Switzerland, there was growing concern over the quality of water in the lakes. In the course of the 1960s and 1970s, increasing attention was drawn to the threats to the water supply. The pessimistic forecasts proved to have been warranted when large numbers of dead fish washed up in the Netherlands. This was caused by accidental discharges of herbicides and pesticides and the declining level of oxygen in the waters of the Rhine. On top of this, the quality of the drinking water in the Netherlands and Germany worsened. The Swiss and Dutch increasingly shared the German concerns over the rising temperature of the river. And the Swiss became increasingly aware of the tendency of eutrophication. As the inflow of fertilizers increased, the amount of algae in the Swiss lakes rose sharply.

Because of its location downstream, the Netherlands experienced the most serious threats to water quality. The drinking water companies and the greenhouse horticulture farmers in the region of Westland were increasingly concerned over the rising level of salinity of the Rhine. The asymmetric nature of the problem became even more evident as the French potassium mines discharged increasing amounts of salt. As a result of the German ‘Wirtschaftswunder’, the Dutch were confronted with a worsening oxygen balance, an increase in the load of salt and new issues such as discharged heavy metals and pollution by organic microorganisms. The asymmetric nature of the problems was emphasized during the period of stalemates (1976–1986). Fewer problems were perceived upstream, because the more rigorous efforts at purification were showing some results. The Netherlands, however, kept suffering from the cumulative effect of the discharges taking place further up the river.

After 1986, the symmetry in the perception of the problems increased once more. The huge chemical spill caused by the Swiss Sandoz corporation heightened public awareness that massive industrialization leads to major risks for the environment throughout the catchment area. Moreover, the advancing eutrophication of the German Bight in the North Sea led to a growing awareness among the public in Germany that they occupied a dual position — upstream as well as downstream — in the Rhine catchment area.

In summary, it may be concluded that the development of the Rhine regime confirms the theoretical insights.

5. Values, interest groups, and the development of the regime

Through time, the values in the riparian states remained broadly similar. Throughout the catchment area, there was a deepening sense of the importance of the quality of the (aquatic) environment. Already in 1946 it was observed that the opinions of people concerning ‘stinking water’ had changed. “Stench, the development of gaseous emissions, a hideous appearance, and the death of fish no longer go unnoticed. People consider it a shortcoming that while the

streets are kept neat and clean, the water is neglected” (Wibaut, 1946, p. 51; translation by the author). Even before World War II, in fact, this change was reflected in the centralization of the provision of drinking water, the adoption of the first laws and regulations concerning water pollution and the actual implementation of water purification measures. After the war, the number of such initiatives continued to increase, especially in the early 1970s. During this first ‘environmental wave’, dedicated environmental departments were set up throughout the entire catchment area. Pollution surcharges and measures against the marketing of poorly degradable detergents followed. Early Swiss initiatives — such as the introduction of the technology to remove phosphates at water purification installations in the lakes region, and consultations with manufacturers to limit the addition of phosphates to detergents — were copied at a later stage by the other riparian states. During the ‘second environmental wave’ in the mid-1980s, environmental issues were again splashed broadly over the front pages of the newspapers. More than ever, the issue of the quality of Rhine water was discussed from an ‘ecocentric’ perspective. Especially in Germany and the Netherlands, the amount of exposure of this issue fueled the public interest in nature development.

Professional interest groups — such as the Dutch association against water, soil and air pollution, the German association for water and gas exploitation and the Swiss association for water protection had already been founded at the beginning of the 20th century. Initially, there were hardly any contacts among these organizations. The Dutch Rhine commission of drinking water companies (Rijncommissie Waterleidingbedrijven RIWA), the German association for water protection (Verein Deutscher Gewässerschutz VDG), and the caucus of Rhine waterworks (Arbeitsgemeinschaft Rheinwasserwerke ARW) broke the ground for international cooperation. Upstream, German, Swiss and some French drinking water companies shaped the caucus of waterworks for the Bodensee and the Rhine (Arbeitsgemeinschaft Wasserwerke Bodensee–Rhein AWBR). In the early 1970s, the drinking water companies intensified the coordination of their interests, on the catchment level in the international caucus of waterworks in the catchment areas of the Rhine (Internationale Arbeitsgemeinschaft der Wasserwerke im Rheineinzugsgebiet IAWR) and on the European level in Eureau. The Dutch environmental organizations that cooperated in the Foundation for Nature and the Environment (Stichting Natuur en Milieu) established international contacts through the International Rhine Group and the European Environmental Bureau. Moreover, the Dutch Clean Water foundation (Reinwater) started long-running legal proceedings against the salt discharges by the French potassium mines. This strategy was joined by the Dutch drinking water companies in the 1980s. The City of Rotterdam was also inspired by this example.

Germany and Switzerland proved to be the most innovative of the riparian states in the realm of the environment. At some distance, their lead was followed by the Netherlands and France. The trend of increasing homogeneity among the riparian states was only broken during periods of stalemates. Lobbyists from the Alsace succeeded in mobilizing a majority in the French parliament to oppose the Rhine Salt Treaty. This heralded the breakdown of the consensus that had prevailed at the level of national governments over the cuts in the salt discharges by switching to the method of injecting waste salt into the ground.

Obviously, the development of the Rhine regime conforms to the expectations expressed earlier in this report.

6. The development of knowledge and of the regime

The first investigations into the quality of surface water in the catchment area date back to the last century. Since then, the research has become ever more systematic, and its volume has expanded continuously.

There was a gradual increase in the number of water quality parameters being monitored. The increase was brought about mainly by the introduction of a new measuring and analysis technique, namely gas chromatography, by the end of the 1960s. Apart from salts, heavy metals and organic micropollution of the water could also be measured with this technique. Time-series analyses provided better insight into the development of the pollution. An international net of measuring points was set up to get a better picture of the spatial dimensions of the pollution. The knowledge base also expanded because more parameters could be continuously monitored. During the 1980s, a growing number of investigations were carried out on the quality of the riverbed and on ecological development in the catchment area.

Contacts between the Dutch drinking water industry and its German and French counterparts were established long before World War II to investigate water quality. Because of the International Rhine Commission, these contacts had multiplied. Government officials exchanged insights, but many other institutions were also active in the field. For instance, the umbrella organizations of the drinking water industry IAWR, RIWA, ARW and AWBR as well as the association against water, soil and air pollution (Vereniging tegen water-, bodem-, en luchtverontreiniging), the Swiss water protection association (Schweizerische Verein für Gewässerschutz) and the federation for European water protection (Federation Europäische Gewässerschutz) became involved in the dissemination of knowledge regarding the quality of water in the River Rhine. Also the environmental movement and the private sector became involved in this ever-expanding epistemic community. The environmental movement revealed the actual origin of the pollution on the basis of number of measuring campaigns. Later, the private sector provided concrete data on the discharges; these figures were subsequently published by the IRC. The epistemic community took charge of the harmonization of measuring methods. They also took care of the dissemination of the perceptions of the problems and the directions in which to look for their resolution.

Even during the period of the stalemates, the knowledge base and the epistemic community kept expanding. For example, the IRC introduced new methods to monitor organic micropollution during this time, as well as the automation of the data communication. Meanwhile, the environmental movement kept up its own investigations. On this basis, we may conclude that while these factors stimulate the further development of the regime, neither the growth of knowledge nor the development of an epistemic community will necessarily lead to the development of a regime.

7. Options for interaction and regime development

The expansion of the options for interaction has stimulated the development of the regime.

The number of international organizations involved in the discussions on water quality has grown significantly since World War II.

Before the war, there were few possibilities to discuss the issue of pollution in an international context. Only the central commission for Rhine navigation and the commission for salmon fishery offered a platform for interaction among the riparian states. Therefore, meetings of both commissions were used as occasions to bring up the pollution issue. In that sense, they were able to facilitate the negotiations. This role was subsequently taken over by the IRC, which slowly expanded its (staff) capacity to facilitate the negotiations among the riparian states. Also new intergovernmental organizations started to focus on the issue of water quality. These include the Commission for the Hydrology of the Rhine Catchment area, the Commission for the Protection of the Moselle and the Bodensee Committee. Moreover, it was of eminent importance that the European Commission put water pollution on its agenda. Similar initiatives had already taken place in the Council of Europe. From these platforms, ideas were transferred to the riparian states.

In the period of stalemates, these platforms offered the possibility for interaction among the riparian states. Moreover, during these periods, two interparliamentary conferences were convened to discuss the pollution of the Rhine. This demonstrates that the expansion of the possibilities for interaction does not necessarily result in a progressive development of the regime.

8. Negotiation strategy and regime development

The creation of the Rhine regime was primarily an accomplishment of the riparian states themselves. At no time during the process was there a call for arbitration by a third party. In their negotiations, the riparian states used divisive as well as integrative tactics. The Netherlands made the most far-reaching demands, in view of its downstream location. For instance, the Dutch called for the establishment of an International Rhine Commission with extensive powers. They insisted on an early start with controls on the discharge of salts and other chemicals. Under the auspices of the Rhine Action Program, the Netherlands presented its ideas for the ecological recovery of the catchment area. The other riparian states did not always show much enthusiasm for the Dutch proposals. However, by introducing trade-off options and by employing more integrative tactics, the negotiations kept moving forward.

8.1. Trade-off options

Trade-off options were identified in the course of the entire process, except during the period of the stalemates. The Netherlands and Switzerland were able to induce Germany and France to agree to formalize the mandate of the IRC in 1963. The Germans agreed to do so on condition that the offices of the IRC would be established in Germany. This served to improve the international prestige of Germany, a reputation that had been sullied during World War II. France agreed to sign because this compromise proved to be less expensive than earlier proposals.

With respect to cutting back the amount of salts allowed to be discharged, the Netherlands

managed to make France agree to its proposals by offering to help pay for measures to be taken in France. Specifically, the copayment would apply to an effort to explore the options to reduce the waste and the preparation of the subsoil and underground layers for the storage. Germany and Switzerland also contributed because their discharge of salts — together, at least as substantial as the amount discharged by France — did not have to be reduced. In exchange for their financial contribution, the Swiss were even permitted to increase the volume of salt they could discharge. The Germans managed to have the French agree to close down some salt storage basins in the Alsace, from which salts had leaked into Germany's groundwater. The decision to devote the 1972 ministerial conference of the riparian states to a program for a full clean-up of the river was partly based on the assumption that this would encourage France to take measures to deal with its salt. Nevertheless, it took many years before the Rhine Salt Treaty was wrapped up. The negotiations were finally concluded by the end of the 1980s, when the Netherlands proposed a package deal that was not only less expensive, but also more flexible. It was agreed that the French would only have to shift to storing their waste salt when the water level was low. Furthermore, the riparian states would contribute to the measures that needed to be taken in the Netherlands. The Swiss got an extra reduction of their financial contribution.

The final version of the Rhine Chemicals Treaty was concluded after the Netherlands managed to reach full agreement with Germany. From the perspective of the Netherlands, it was important for the various eutrophication-causing materials to be covered by the Rhine Chemicals Treaty. In exchange, the Germans got the concession that the applicable area of the treaty was enlarged to include the Rotterdam port area. German agreement to the Rhine Action Program was finally obtained when the Dutch dropped their intention to start a lawsuit against German industry. At the same time, the period over which the reductions were calculated was stretched. This was done so that the calculations could take the effects of measures already implemented in Germany into account.

8.2. Integrative tactics

Throughout the entire process, the parties to the negotiations frequently employed integrative tactics. This meant that negotiations on divisive and more integrative topics were separated on the agenda. To assure that these negotiations would not negatively impact each other, separate working groups were set up within the IRC. Because of their existence and the expansion of the agenda for negotiations, the number of actors involved and the size of the delegations grew as well. In addition to the officials, the activities of the IRC also involved representatives, ministers and undersecretaries in the course of the 1970s. At various levels, brainstorming sessions were convened to discuss separate aspects of the issue of water quality. Once the conflict over the salt was settled, the brainstorming sessions of the IRC became more harmonious and informal.

'Objective criteria' were regularly introduced in the negotiations. The structure of the Commission for the Moselle and the Saar as well as that of the American–Canadian International Joint Commission served as a source of inspiration for the riparian states. This was also the case with other external sources, such as the norms established by the WHO concerning chlorides. The list of hazardous substances that had been agreed upon in the

context of the Oslo Dumping Convention and the negotiations for a European rivers treaty were taken as ‘objective’ reference standards in the Rhine negotiations. The German proposal to adopt the draft Framework directive for water pollution from the European Community as the starting point for the negotiations on the Rhine Chemicals Treaty was accepted. In the elaboration of the Treaty in substance-specific emission norms the American toxicity data were frequently consulted. Finally, the drafting of the text for the Rhine Action Program derived inspiration from some of the EC guidelines for water quality.

In all periods, the negotiations were concluded with a number of contingencies. The postwar negotiations on the IRC initially resulted in a legally non-binding mandate. Consequently, the investigations of the IRC and the further regime development remained dependent on the commitment of all parties involved. The Treaty of Bern, the Rhine Salt Treaty and the Rhine Chemicals Treaty contained restrictive clauses. These specified that the treaties would only be legally binding after ratification. Furthermore, they stipulated that each of the riparian states could unilaterally cancel the treaty, thus providing a way to dissuade free-rider behavior. Moreover, the Rhine Salt Treaty contained a link between the phasing of the measures to be implemented in France and the financial contributions from all riparian states. The one should not proceed without the other. However, France would be allowed to terminate any measures to be taken (i.e. injecting salts into the ground) if the environment were to sustain damage. The new compromise concerning the discharge of salts reached by the end of the 1980s also included a link between the financing and the implementation of measures. To motivate France to actually store the salt when the water level at Lobith on the Dutch border was low, all the riparian states prepaid their financial contributions. However, this agreement was conditional: France would be released from its storage obligations as soon as the estimated financial means had been spent. Because the Rhine Chemicals Treaty was shaped as a framework agreement that needed further elaboration, and because the RAP was only binding in a political sense, also these negotiations were concluded with a contingency stipulation. Each state retained the option to terminate the implementation of measures if other states would not carry out their part of the bargain. The specification of unambiguous performance indicators allowed for monitoring whether or not the riparian states were committed to the task. It also provided a way to check on the extent of this commitment to realize the goals of the RAP. These contingencies served to reduce free-rider behavior.

During periods of stalemates, the course of the negotiations deviated from that taken during the other periods in two respects. Neither in the salt negotiations nor in the elaboration of the Rhine Chemicals Treaty were any trade-off options available. Moreover, the number of persons involved in the negotiations remained stable. The application of other integrative tactics — such as the separation of divisive and integrative topics or the introduction of ‘objective’ criteria and contingencies — did not prevent the IRC from getting bogged down. Little progress was made during this period. Apparently, the availability of trade-off options was a necessary condition to develop the Rhine regime.

9. The solution for the Rhine water conflict?

The point of departure for this essay was the proposition that the Rhine regime contains —

Table 2
Factors stimulating the development of the Rhine regime

<i>Factors derived from regime theory</i>
Increase of problem symmetry
Increase of the social appreciation of environmental quality
Continuing professionalization and internationalization of interest groups
Increasing homogeneity of the constituencies
Knowledge development
Continuing growth of an epistemic community
Increase of the options for interactions
Increase of experience derived from elsewhere
Expansion of the facilitation capacities of a catchment area organization
<i>Factors derived from negotiation theory</i>
Expansion of the number of trade-off options
Growth of the size of the delegations to the negotiations
Separation of divisive from integrative issues
The convening of brainstorming sessions
The introduction of 'objective criteria'
The conclusion of negotiations by introducing contingencies

at least on paper — a number of unique characteristics. It is legally binding, comprehensive, specific and ambitious. Yet the Rhine regime is not a paper tiger; it has proved to be a successful regime in practice as well. Many of the goals that were set over the years have already been attained. The agreed-upon international obligations have been converted into national legislation and regulations, and the actions of the relevant actors conform to these. Throughout the catchment area, purification measures have been taken. The time-series analyses that have been carried out on the parameters of water quality reveal a demonstrable improvement in quality. The concentrations of oxygen-binding and eutrophication-causing substances, chloride, heavy metals and micropollutants have decreased significantly. The drinking water companies as well as the environmental organizations underline the success of the Rhine regime². The common drawback of many international regimes — so aptly summed up by Haas (1984, p. 23) in the aphorism, “Sticks and stones can break my bones, but words can never hurt me” — does not prove to be applicable to the case of the Rhine. This observation gains even more significance when one realizes that the clean-up took place during a period of substantial net economic expansion in the riparian states. In spite of this strong growth, the situation is no longer urgent. The Rhine has changed from an open sewer into a river where some salmon have been caught in the recent past.

² These indicators have been derived from Young's considerations (1994, p. 142 *passim*) of various dimensions of the concept of effectiveness. On the basis of his thorough analysis of the development of regimes, Young concludes that effectiveness may be interpreted in several ways. It is “a multidimensional variable whose separate dimensions need not and frequently do not covary in any simple way”. Among the relevant dimensions of effectiveness, Young specifies the capacity to reach set objectives (“effectiveness as goal attainment”), conformity (“process and behavioral effectiveness”) and satisfaction (“effectiveness as problem solving”). He combines stability, efficiency and equity into a rest category (“evaluative effectiveness”).

10. Lessons

The Rhine regime is a unique and successful regime. Governments and interest groups all over the catchment area agree on this. Even the Dutch drinking water companies and the Dutch environmental movement, the most demanding parties are satisfied. During the negotiations the government of the Netherlands has always sought a strict regime. The existing regime is highly inspired by Dutch proposals. However, the improving water quality made Dutch negotiators more flexible in their demands. They could abstain from former Dutch ideas like granting supranational powers to the ICPR (majority voting) and the immediate stop of the discharges of black list substances.

Though it is unique, we may be able to derive some lessons from the development of the Rhine regime that may apply to regime development on other issues. Specifically, this analysis has highlighted how certain factors distilled from regime and negotiation theories have stimulated the regime's progress. Table 2 gives an overview of these factors.

At the same time, a number of these factors had an opposite effect. Instead of stimulating the development of the Rhine regime, they proved to slow down its progress. It may be useful to reconsider what happened during the period 1976–1986. That period was characterized above as a time of stalemates in the development of a regime. However, it may also be characterized on the basis of independent factors. Compared to the preceding and subsequent periods, there was a decrease in the problem symmetry and in the homogeneity of the societal values of the negotiating parties. Moreover, the number of options to achieve trade-offs decreased. The coincidence of the trends suggests that these factors tend to impede progress. Finally, it has been shown that the development of the regime could proceed in times of good relations among the parties as well as in times of internal tensions. This implies that this factor is meaningless. There is also no evidence that arbitration among the riparian states played a role.

11. Conclusions

This article has identified the factors that contributed to the progressive development of the Rhine regime. These factors can be combined into three crucial conditions, which can also serve to promote a successful regime development elsewhere.

First of all, the history of the Rhine negotiations shows that the chance of a successful regime development increases when certain conditions are met. Specifically, success is likely when the downstream government is active and alert, when it commands sufficient means to support its arguments and when it has something to offer upstream governments in the form of compensation, financial or otherwise.

Moreover, the case shows that the chance of a successful regime development increases if a large measure of homogeneity exists among the riparian states. The absence of any deep-seated animosity would certainly enhance the parties' willingness to consider to each other's problems. In the Rhine catchment area, the upstream parties proved to be good discussion partners for the Dutch government.

It is possible that this combination of a downstream partner taking many initiatives and

cooperative upstream parties is the most important condition for success in regime development. However, the analysis has also shown that the presence of an organization of the catchment area can contribute to the resolution of transboundary conflicts over water quality issues. Such an organization can facilitate a good exchange of knowledge and can provide a non-threatening environment for people to talk. By collecting and developing knowledge, it can offer the governmental and non-governmental organizations involved in the process the same 'facts' to use as their starting points. This may be important for the process of setting an agenda, prioritizing the issues and monitoring the measures. By facilitating the negotiations, an organization may contribute to the structuring of the communication. The organization could move from single to multipurpose as societal values change. Hence, it may be concluded that the chance of success in regime development increases if all relevant parties discuss the quality of a water system under the umbrella of an organization that covers the full extent of a river catchment area.

These three conditions have also been identified by other authors (compare for instance Warner (1996) and Wessel (1996)). The importance of a catchment area organization has also been recognized by policy-makers. This is apparent from the results of setting up commissions for the Elbe, the Oder, the Meuse and the Scheldt rivers in the 1990s³.

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³ The Treaty of Helsinki called for the installation of catchment area management organizations. Agenda 21 argues, in its Chapter 18, for the introduction of integrated water management at the level of catchment areas. Recent developments with respect to a new directive of the European Commission for water systems, as well as the subsidy programs of the Commission, show that the EC also endorses the use of an area-based approach. This is reflected in the Commission's decision to make funds available to the countries in the catchment area of the Danube to initiate an organization charged with its management (Danube Programme Coordination Unit, 1995).

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