# Chapter 10: Nagara River Estuary Barrage Conflict

Norio Okada[1], Hirokazu Tatano[1], and Alkiyoshi Takagi[2]

[1]Disaster Prevention Research Institute, Kyoto University

[2]Faculty of Engineering, Gifu University

## Introduction

This case study is an application of IRGC's Risk Governance Framework to an actual water resources management problem which challenged the disaster risk governance system in Japan, the construction of the Nagara River Estuary Barrage. It represents an example of a problem in which decision-makers were faced with difficult tradeoffs between protection of public safety and important water resources on the one hand, and concerns about adverse socio-economic and environmental impacts of the barrage on the other. This problem also illustrates the evolving nature of conflicts over time, where the values that dominated the decisions in the early planning stages were not those that drove public opinion toward the end.

The Nagara River Estuary Barrage was planned at the mouth of the Nagara River by the Ministry of Construction of the Japanese Government in order to develop water resources and mitigate flood disasters. The Nagara river runs through the Nagoya metropolitan region which is the third largest metropolitan area in population and a very important industrial area for Japanese economy, especially, automobile and machinery industries. However, local fishermen and eventually became opposed to the plan, and were joined in their opposition by an emerging new group of environmentalists. Crucial conflicts occurred among government officials, local people and societal groups holding diverse values. The conflicts have become compounded, evolved and lasted from 1968 to now, though some tentative resolution seems to have been reached.

The chapter consists of three parts: the first part provides the reader with the history of this project and related conflicts; the second part is a retrospective analysis of the Nagara River Estuary Barrage conflict within the context of the IRGC risk governance framework; and the third provides our conclusions about the applicability and limitations of the framework and our recommendations for the future.

## The Nagara River Estuary Barrage Conflict

### Nagara River Estuary Barrage

The Nagara River flows out of the mountains of Gifu Prefecture situated in central Japan. For roughly a half of its 136-kilometer course, it runs southwards through narrow valleys. Then, flowing through high dykes, it makes its way across the Nobi Plain before flowing into Ise Bay. Until recently, it was one of the last major rivers without a barrage in Japan.

In the 1960's, Japan was in a period the Japanese refer to as 'Kodo Keizai Seicho Ki' or the 'Era of Rapid Growth of Japanese Economy'. Japan's Water Resources Development Agency (WRDA) was established in 1962. It was anticipated that industrial water shortage could become a bottleneck for continued economic growth. As a result, major water resources development plans were made all over Japan during this period. The Kiso River System Master plan, which was officially completed in 1968, included development of the Nagara River Estuary Barrage. It was not until 1995 that the barrage project was finally completed.

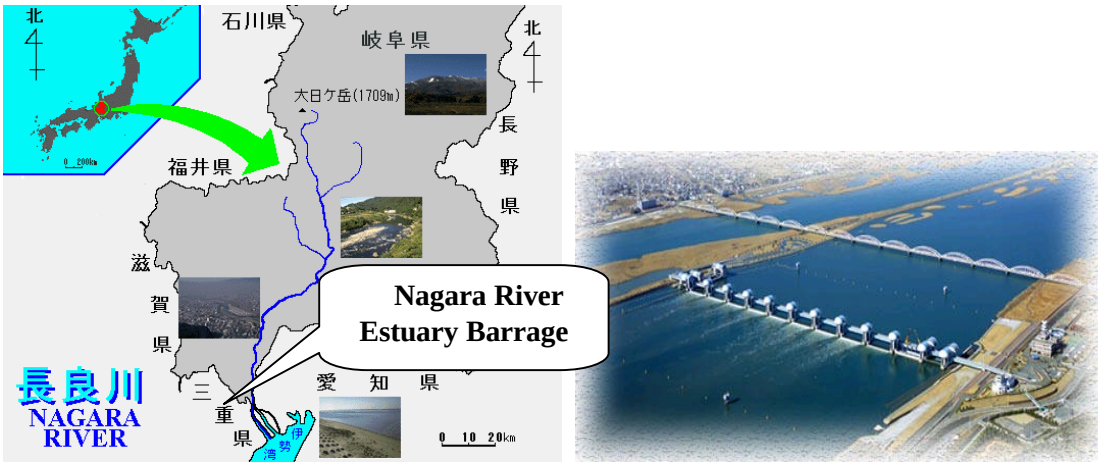


Figure 1 Nagara River Estuary Barrage

## Purpose of the Barrage

The Nagara River Estuary Barrage was designed for two purposes, flood control, and protection of water supply. It enables implementation of large-scale dredging projects which in turn guide safe water flow of the Nagara River in case of flooding. The barrage also prevents upstream intrusion of saltwater, thereby making it possible to make extra fresh water available as domestic water and industrial water supplies for Aichi Prefecture, Mie Prefecture and Nagoya City. Table 1 shows the progress of revising the plan.

## Evolution of Conflict: Changes in Issues and Key Stakeholders

The project faced a long time lag between its inception in 1968 and completion in 1995. A number of changes occurred in both the original economic incentives for the project and in the societal values surrounding such projects in general. Industrial water demand dropped due to both increased use of recycled water by heavy industries and structural shifts in Japanese industry, particularly from that of materials production (e.g. iron and chemicals) to manufacturing (e.g. automobiles and electronic equipment). Though the plan remained unchanged for a long period of time, this decline in industry's water demand was paralleled by declines in both municipal and agricultural water demand; ultimately, the planned supply from the Nagara River Estuary Barrage declined accordingly (see Table 1). In the same time period, the general public began to place greater emphasis on sustainable society than on economic development. Issues like the preservation of nature increasingly gained public awareness and support, and stakeholders requested it be given a higher priority than before in public project development.

Table 1 Water Resources Development Plan in the Kiso River System

| | Date | Planned Volume of Water Supply | Facilities |
|---|---|---|---|
| Master Plan | 1968.10.15 | $73m^3/s$ *1 | Nagara River Estuary Barrage |
| Total Revision | 1968.10.15 | $121m^3/s$ *2 | Three other dams development plans are included |
| Total Revision | 1993.3.31 | $34m^3/s$ *3 | |

| | Target Year | Municipal Water | Industrial Water | Irrigation | Total =Target Water Supply | Capacity of Facility in Target water supply |
|---|---|---|---|---|---|---|
| *1 | 1985 | 25 | 42 | 6 | 73 | 65 |
| *2 | 1995 | 40 | 60 | 22 | 121 | 83 |
| *3 | 2000 | 14 | 6 | 14 | 34 | 49 |

The conflict surrounding the construction of the Nagara River Estuary Barrage fell into roughly three stages, discussed below. A complete chronology of the barrage planning, construction and conflict is shown in Table 2.

***First stage: 1973 to 1981***

The first stage was marked by a lawsuit against the WRDA, brought by an opposition group, demanding that the court suspend construction of the barrage. The key stakeholders bringing the suit at this stage were inhabitants in the area at the mouth of the river and fishermen. Their key concern was whether the barrage would really contribute to flood control. After the suit was filed, industrial water demand dropped down. Shortly afterward, the appeal was dismissed.

***Second stage: 1982 to 1998***

The second stage of the conflict was initiated by a second lawsuit against the WRDA, again demanding suspension of construction of the barrage. The major stakeholders against the barrage were the inhabitants in upper and middle of the Nagara river basin whose key concerns were the environmental impacts of the dam. On the other side of the debate were the WRDA and citizens in flood prone areas. The WRDA won this lawsuit. It was quite likely that the court made that judgment by overall assessment of what was then the public consensus (i.e., support of infrastructure development).

***Third stage 1999 to Present***

The third has been characterized by use of arbitration and Round Table conferences. A key concern is preservation of nature put forward by nature enthusiasts living outside of the basin. The stakeholders who continue to support the project include the WRDA and citizens who live in flood prone areas protected by the barrage.

## Retrospective Analysis Using the IRGC Framework

The Nagara River Estuary Barrage conflict has spanned over three decades and many economic, social and environmental changes since it was first proposed. Our analysis is therefore a retrospective assessment of how the conflict was managed and how the IRGC Risk Governance Framework might have helped improve the process. The organization follows the five phases of the IRGC framework: “Pre-Assessment”, “Risk Appraisal”, “Tolerability and Acceptability Assessment”, “Risk Characterization and Risk Evaluation”, and “Risk Management”.

## Pre-Assessment

It seems quite likely that the problems faced by this water resources development and management project in Japan had their beginning in what IRGC calls the "pre-assessment" phase. A principal purpose of the pre-assessment phase of the IRGC framework is to develop a common frame or basis for discussing the risks. This requires a "common understanding of the risk issue(s) being addressed... or to raise awareness amongst the parties of the differences in what is perceived as risk" (IRGC, 2005). In retrospect, it appears that the Ministry of Construction, the WRDA and others responsible for this project started to deal with this large-scale construction project within a traditional frame -- a top-down public sector approach typical for that period of Japan's development. Within this frame, the risks that were the focus of the project were 1) flooding and 2) insufficient water supply to meet what were then growing fresh water demands from the industrial, agricultural and municipal sectors.

The question is then, "Had the authorities conducted a pre-assessment like that recommended by IRGC could they have avoided the conflicts that followed?" Our answer is probably, "No" because nobody could have anticipated the two major changes in the basic context for the project: 1) the decline in the industrial demand for water supply and 2) the crucial shift in the public's preference from economic development to sustainable growth and protection of the environment.

However, implementation of the proactive practices recommended in the pre-assessment phase of the IRGC framework might have helped avoid sowing the seeds of mutual distrust and suspicions that later gave rise to the larger conflict. Through the use of scientific workshops appealing to the public, early framing, initial screening of possible issues and discussion of the "major assumptions, conventions and rules for assessing risk", citizens could have benefited from better access to information. The development of "early warning" or monitoring systems whereby emerging problems could be identified and discussed as the project went forward might also have provided greater opportunity for communication. We presume that it was the lack of such communication that eventually led opponents to file the first lawsuit. Therefore, appropriate and timelier implementation of the IRGC pre-assessment phase might have helped the conflict take a different path, leading to much faster resolution.

## Risk Appraisal

A complete risk appraisal process, one which included both the risk assessment and concern assessment components of the IRGC framework, was also not a part of the early

planning phases of the Nagara River Estuary Project. The reality is that the mindset of the Ministry of Construction, the WRDA, and other agencies responsible for the project and their framing of the problem as a large public works project largely limited the scope of potential and emerging risks they were willing to address openly and proactively. They thus were more likely to dismiss public concerns. The authorities appeared to do a better job of listening to the concerns of more "direct interest groups", like fishermen, and other potential stakeholders who could claim financial compensation for damages resulting from the construction of the barrage. Little care seemed to be taken to address public concerns about "lack of participation" or the concerns of emerging "external citizen groups" who were highly sensitized to any potential loss of habitat and of endangered species living in the Nagara River.

It seems likely that had a risk assessment and, in particular, a "concern assessment**,**" been conducted, it could have made the situation much better. The responsible Ministry, agencies and citizens could have reached better understanding of the issues and of each others' concerns before the plan was decided and put into practice.

Nonetheless, it is important to acknowledge that it would have remained difficult to overcome the fundamental split in concerns about the risks and values held by proponents and opponents of the barrage. One hopes however, that the public sector would have become more sensitized to the concerns of "minority" groups who at that time had virtually no access to open public debate. The IRGC's alternative approach to governance might have changed the dismal mood of mistrust, which contributed to years of bitter conflict.

### Tolerability and Acceptability Judgment

Given that the early planning for the Nagara River Estuary Barrage did not include the equivalent of the pre-assessment and risk appraisal phases of the IRGC framework, it is not surprising that explicit implementation of a "tolerability and acceptability judgment" phase was also missing. The basic groundwork --- identification of the full array of risks and concerns from a broader group of stakeholders --- had not been laid. Consequently, informed discussions about the tolerability or acceptability of these issues could not be properly conducted.

### Risk Management

The problems encountered in the risk management phase of the Nagara River Estuary Barrage project were perhaps rooted in the basic framing of the problem earlier on, as noted in our discussion of the 'Pre-assessment phase.' In terms of the "risk characteristics and their

implications for risk management" (see Table 6 in Chapter 1 of this volume), the Ministry of Construction, WRDA, and other public agencies primarily engaged in the project had mistakenly assumed that the risks could be classified as "simple risk problems". As a result, they relied on what IRGC's framework refers to as "routine-based management strategies" for a problem that turned out to be much more complex and uncertain.

## The Cyclic Nature of the IRGC Risk Governance Framework; the Risk Management Escalator and Stakeholder Involvement

The IRGC framework on risk governance envisions risk governance as a cyclic process in which a project might go through a number of stages or cycles depending on the initial characterization of the risks involved and on the evolution of knowledge about the risks over time. It represents this concept in Figure 1, Risk Management Escalator and Stakeholder Involvement, in which risks may fall into one of four broad categories, "Simple, Complexity Induced, Uncertainty induced, and Ambiguity Induced."[1]

In retrospect, the entire process of evolving conflict surrounding the Nagara River Estuary Barrage could have been divided into three stages. The timing of each stage shift could have been an appropriate time for the core governmental agents to climb up to a higher step of the "Risk Management Escalator and Stakeholder Involvement", thus proceeding to another round of the cyclic process.

Even if the Nagara River Estuary Barrage project had been incorrectly characterized as a "simple" risk problem, if it had properly gone through the IRGC risk governance process (i.e. from "Pre-assessment", "Risk Appraisal", "Tolerability and Acceptability Judgment", then to "Risk Management"), the whole picture might have been totally different. Decision-makers might have become aware of the emerging shift of public values, become more sensitized to people's concerns, and therefore might eventually have reached a much better outcome.

However, it is quite likely that what appeared as a typical water resources management project at the outset, a "simple risk problem" actually should have been considered at least an "Uncertainty-induced Risk Problem." It later evolved into a more "Ambiguity-induced Risk Problem" as the differences in public values emerged. If the relevant stakeholders had been able to engage in thoughtful discourse at an earlier and more appropriate time, the conflict would at a minimum have been better handled, if not finally settled down. The proposal late in the conflict to develop a system for publicly monitoring the impact of the completed barrage on the river

[1] Note that this concept and figure were introduced after the publication of the original white paper.

ecosystem is evidence of a good outcome from constructive dialogue between stakeholders. This proposal was ultimately implemented.

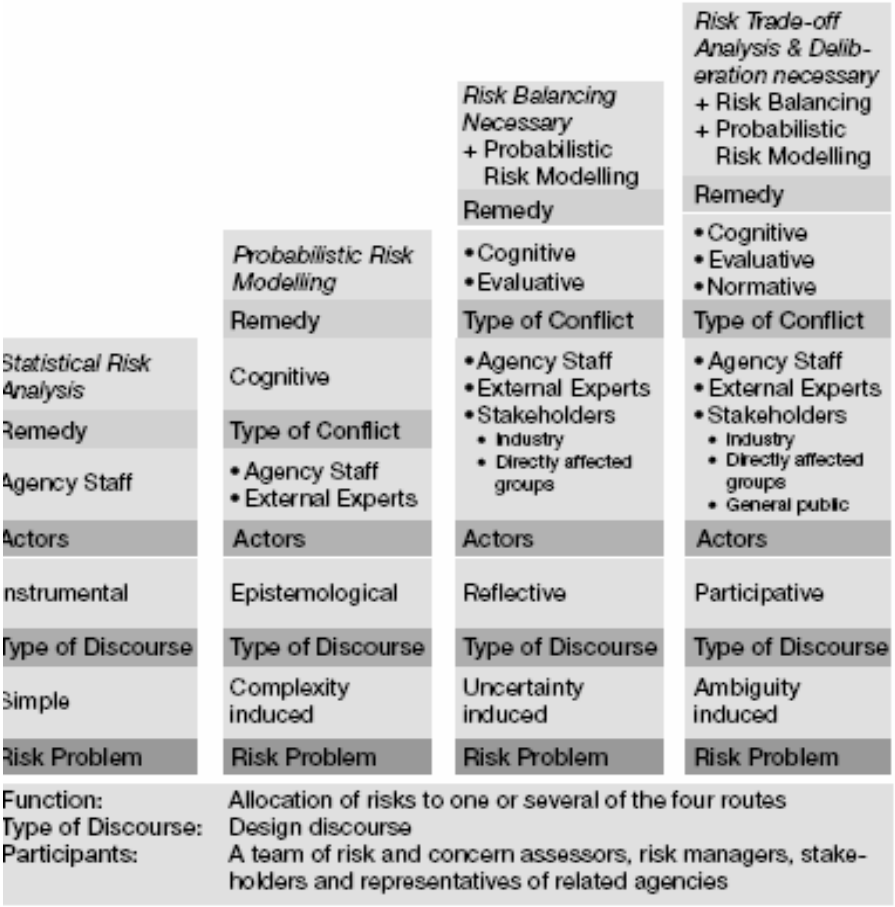


Figure 2: The Risk Management Escalator and Stakeholder Involvement (from simple via complex and uncertain to ambiguous phenomena)

## Discussion and Conclusions

Our study of the Nagara River Estuary Barrage shows that IRGC's proposed risk governance framework can provide an effective process through which potential users can critically review an actual conflict resolution problem, identify the governance lapses that occurred, and reflect on

how these lapses may have contributed to a prolonged conflict. Stakeholders on all sides of the issue can reflect on how the process could have been handled differently and achieved outcomes more acceptable to all involved.

The real challenge to the IRGC is to extend this methodology to current public projects or to prospective future projects. In order to do so, IRGC will need to address some of the distinctive difficulties in interpretation and practical application of the framework that we have identified in the course of our retrospective analysis. We raise the following questions:

1. **At which step of the "Risk Management Escalator and Stakeholder Involvement" (Figure 1) should a project start?** The answer to this question may not be easy. In reality, stakeholders often have only limited information and knowledge to identify whether the risk is in fact a "simple" one more "complex", "uncertain", or "ambiguous". A safer strategy might be to start with the assumption of an "Uncertainty-induced Risk Problem" which would ensure involvement of a broader representation of stakeholders and identification of the key risks and concerns early in the process.

2. **How can we set up sound institutional practices or guidelines that will help achieve the objectives of the IRGC's Risk Management Escalator?** Our answer is that the IRGC needs to propose the tools that might help institutionalize (or otherwise realize) the theoretical risk governance goals (e.g., development of laws or ordinances for public participation, release of public information, for accountability and for transparency).

3. **What happens if conflict is considered highly adversarial or is rooted in a fundamental split in values, and thus apparently impossible to resolve?** Our tentative answer is, "It depends". There may be some cases where IRGC's assumption of a context in which dialogue can occur simply does not apply (e.g. religious conflicts, highly politicized international issues). If there is no room for compromise, and rational and logical reasoning is not occurring, the IRGC's methodology will probably not work until the situation becomes more sensible.

4. **Has this case study provided adequate insight into typical risk governance issues encountered in disaster risk management**? Our response is, "Not yet overall". The type of problem we have addressed in this case study is characterized by potential tradeoffs between disaster risk reduction on the one hand, and other public management goals such as regional economic development and environmental

preservation on the other. More common types of disaster risk management challenges end to involve less conflict among stakeholders and more collaborative risk management. Such issues might be adequately treated as “Complexity-induced Risk problems” or in some cases, as “Uncertainty-induced Risk Problems” and still require appropriate levels of discourse among potential stakeholders.

However, the kinds of discourse envisioned by the IRGC framework are not always easily achieved. For instance, disaster experts and common citizens often find it difficult to communicate. Even experts can have difficulty understanding one another; they may use the same terms, but the terms can mean different things to different technical disciplines. Given these realities, it is often very hard to set up a common communication platform.

We would like to see the IRGC risk governance framework tested with further case studies in Japan and other countries to demonstrate more systematically how it can support prospective stakeholders, including government agencies, to better manage risks and conflicts like those faced in the Nagara River Estuary Barrage project.

Table 2: Historical development of the Nagara River Estuary Barrage Conflict

| | |
|---|---|
| FY1960 | Preliminary survey started. |
| FY1963-FY1967 | The Estuary Resource Survey Team for the Three Kiso Rivers ("KST") conducted survey. |
| FY1968 | Project implementation plan survey started. |
| Oct. 1968 | The Basic Plan for Water Resource Development in the Kiso River Water System (the "basic plan") was decided. |
| FY1971 | Construction began. |
| Dec. 1971 | Policy on implementation announced. |
| Mar. 1973 | Basic plan (partial amendment). |
| Jul. 1973 | Implementation plan approved. |
| Dec. 1973 | Action demanding suspension of construction filed (first suit). |
| Sep. 1976 | Riverbank collapsed at Anpachi Town, Gifu Pref. |
| Mar. 1981 | Suit demanding suspension of construction abandoned (first suit). |
| Apr. 1982 | Suit demanding suspension of construction filed (second suit). |
| Feb. 1988 | All fishermen's cooperative associations agreed on the start of the work. |
| Mar. 1988 | Construction of the main structure of the barrage began. |
| Dec. 1988 | Change of policy toward implementation indicated. |
| Feb. 1989 | Change of policy toward implementation approved. |
| Mar. 1992 | Additional survey report published. |
| Apr. 1992 | Technical report published. |
| Mar. 1993 | Basic plan (complete revision) |
| Apr. 1994 | Nagara Estuary Barrage Survey conducted. (Finished Mar. 1995) |
| Jul. 1994 | Intermediate appeal filed on the case of suspension of construction (Nagoya High Court). |
| Mar. 1994-Apr. | Round table conference held (8 times). |
| Mar. 1995 | Change of implementation plan approved. Facility management policy indicated. Facility management regulation approved. Survey report submitted to Construction Minister Nosaka. |
| Apr. 1995 | Management started. |
| May 1995 | Construction Minister Nosaka: "Full-scale operation from May 23." |
| Jul. 6 1995 | All gates began operating. |
| FY1995-FY1999 | Nagara River Estuary Barrage Monitoring Committee (12 times) |
| Jul. 1997 | Dredging in the mound section started. |
| Apr. 1998 | Diversion to Nagara water supply system started; Diversion to Hokuchusei water supply system started. |
| Dec. 1998 | Court-of-appeal decision on action demanding suspension of construction (Nagoya High Court). |
| Sept. 1999 | 5900 $m^3$/s of discharge observed during Typhoon No.16<br>(Largest discharge after regular operation started). |
| Apr. 2000 | Transition to follow-up survey. |