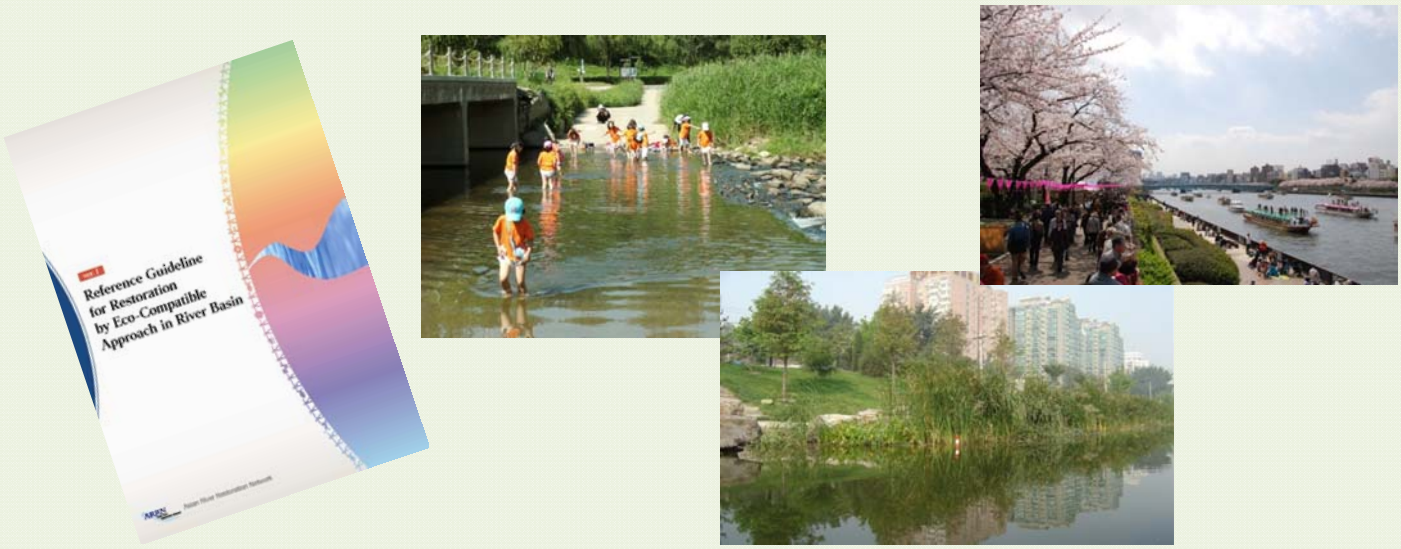
ARRN's Roundtable Meeting

How to develop technology and Guideline
for river restoration through networks



September 14, 2010(Tue.) 16:00-17:30
Seoul, KOREA

Asian River Restoration Network

PARTICIPANTS

Chair:

Dr. Nobuyuki Tamai

- Chairperson of Asian River Restoration Network (ARRN)
- President of International Association for Hydro-Environment Engineering and Research (IAHR)
- Professor, Graduate School, Kanazawa Gakuin University, JAPAN
- Professor Emeritus, University of Tokyo, JAPAN

Co-Chair:

Dr. Bong Hee Lee

- Secretary General of Korea River Restoration Network (KRRN)
- Vice President, Saman Corp. KOREA

Panelists:

Dr. Bart Fokkens

- President of European Centre for River Restoration (ECRR)

Dr. Dongya Sun

- Secretary General of China River Restoration Network (CRRN)
- Professor, China Institute of Water Resources and Hydropower Research (IWHR), CHINA

Dr. Suk Hwan Jang

- Technical Committee of Korea River Restoration Network (KRRN)
- Professor, Daejin University, KOREA

Dr. Naoki Shirakawa

- Technical Committee of Japan River Restoration Network (JRRN)
- Associate Professor, University of Tsukuba, JAPAN

INTRODUCTION

Explanation of geographical features & Review of 7th ARRN International Forum

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

First, I'd like to show a couple of slides to share common view on the geographical features of three countries.

First one, this is the scene of China. I'd like to emphasize that only seven large major rivers cover whole China as you can see from the slide.

Rivers in China

Survey of Rivers

In China, there are more than 50,000 rivers with a basin area of over 100 km^2, about 1,500 of them with a basin exceeding 1,000 km^2. Rivers can be classified into two categories: those discharging into seas (outflowing rivers), and the inland rivers which run to depressions in the interior.

The main river systems in China consist of seven major rivers: The Yangtze, Yellow, Songhua, Pearl, Liaohe, Haihe and Huaihe rivers.

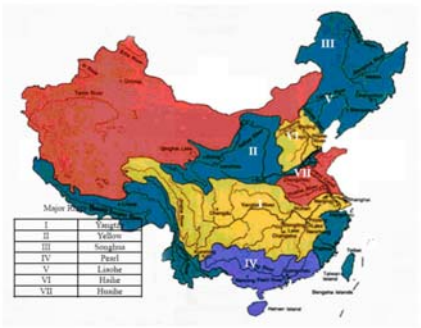


Table1 Date of Seven Major Rivers in Chana

River	River Length (Km)	Basin Area (10^3km^2)	Average Annual Runoff (Km^3)
Yangtze	6,300	1808.5	975.7
Yellow	5,464	752.4	59.2
Songhua	2,308	557.2	74.2
Pearl	2,214	453.7	336.0
Liaohe	1,390	229.0	14.8
Haihe	1,090	263.6	22.8
Huaihe	1,000	269.3	61.1

The main institutions involved in water resources management

the Ministry of Water Resources (MWR)	Responsible for water resources survey and assessment, rural water planning and development, and management and protection of water resources. The Ministry of Water Resources directly supervises the Water Resources and Hydroelectric Power Construction Corporation, and administers 13 higher education institutions and 7 regional basin commissions;
the Local Water Resources Management Department	Responsible for water administration at provincial level. Each province has a Water Resource Bureau responsible for planning, survey, design, construction, operation and management of irrigation, drainage, flood control works, and rural hydro-electricity. Water resources bureaus at the prefecture and county levels are directly responsible for the construction and maintenance of main and secondary canals, associated irrigation and flood control structures, and medium-sized reservoirs;
the Ministry of Geology and Mineral Resources	Cooperates with the MWR in the management of groundwater resources;
the Ministry of Agriculture	Responsible for state agricultural water conservation, construction and management;
the Ministry of Construction	Responsible for urban water conservancy including groundwater exploitation and protection.

Recent river management in China

- Chinese specialists have proposed to take account of ecological and environmental water demand in water resources reallocation since 1980s~1990s to cope with the issues of river zero-flow and water pollution.
- China's water law was enacted in 1988, and principles, general guidelines, and technical standards for water resources management were established.
- In the late 1990s, water sectors of China began to explore the measures to restore rapidly degraded river ecosystems by means of emergency water diversion and achieved initiatory success.
- On September 6 of 2004, Wang Shucheng, the then minister of the Ministry of Water Resources, brought forward for the first time that river basin commission should become the prolocutor of rivers to maintain the healthy life of rivers.
- On August 2009, Chinese Premier Wen Jiabao subscribed the State Council Order (No. 559) of Provisions for Environmental Impact Assessment of New Projects, which demand that environment impact assessment should be conducted on relevant planning of land utilization and exploitation planning of regions, watersheds and sea areas.

Next is Korea. And Korea is in the middle of China and Japan, and the Korean Peninsula has the characteristics of both the continent and the island. So, you can see clearly, the slopes of the Korean rivers are rather steep. The Korean river's length is about 400 to 500 kilometers and the height is close to 100 to 1000 meters.

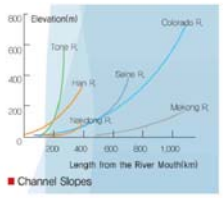
Rivers in Korea

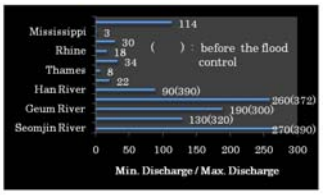
Geographical Characteristics

Most of rivers in Korea flow into the Yellow Sea and South Sea because the east side, where the Taebaek Mountains is, is higher than the west side.

The Han River has the largest basin area and annual discharge in Korea but the longest one is the Nakdong River. Among the ten major rivers in Korea, the Seomjin River has the highest precipitation per unit area in the basin.

Major characteristics of the rivers in Korea are as follows. Firstly, the length of the rivers is relatively short and the channel slopes are steep. Secondly, flooding occurs quickly and peak flood discharge is large. Finally, flow variations are large.



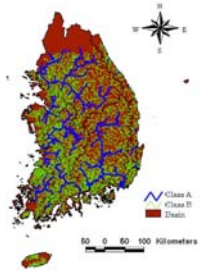


River Administrator

The rivers in Korea are divided into Class A and B defined by the River Act and others defined by small stream regulation Act.

<River Classification in Korea>

Class	No. of River (Length, km)	Administrator
A	61 (2,978.79)	Ministry of Land, Transport and Maritime Affairs (MLTM)
B	3,771 (26,830.50)	Local Government
Others	Not counted	Ministry of Public Administration and Security(MPAS)



Transition of River Management in Korea

1966~ Multi-purpose dam plans for flood control, water use and energy development in response to increasing demand for water resources

1976~ Comprehensive River Basin Development Plan of the four major rivers, Han River, Nakdong River, Geum River, Youngsan River

1981~ Stable water supply, reduction of natural disasters, improvement of Hydro-power resources

1991~ Reasonable development, effective use and management of water resources

In the late 1980's: Close-to-Nature river improvement was introduced

1991 ~ 1998: the research on 'River Environment Management Techniques', developed "Guidelines for Eco-Friendly River Management (revised in 2002)

1995 ~ 1998: river environment improvement projects in Yangjae stream

1997~ Efficient use and management by active demand management and eco-friendly and sustainable water resources development

1999.8: enacted the River Act

1998 ~ 2008: river environment improvement projects(Ohsan, Gyeongan, Streams etc.)

2001~ Sound water use and safe, friendly water environment creation

2002: revised "Guidelines for River Design"

2003~2005: river restoration of Chunggye Stream

2004.1: enacted the River Act

2005: revised "Guidelines for River Design"

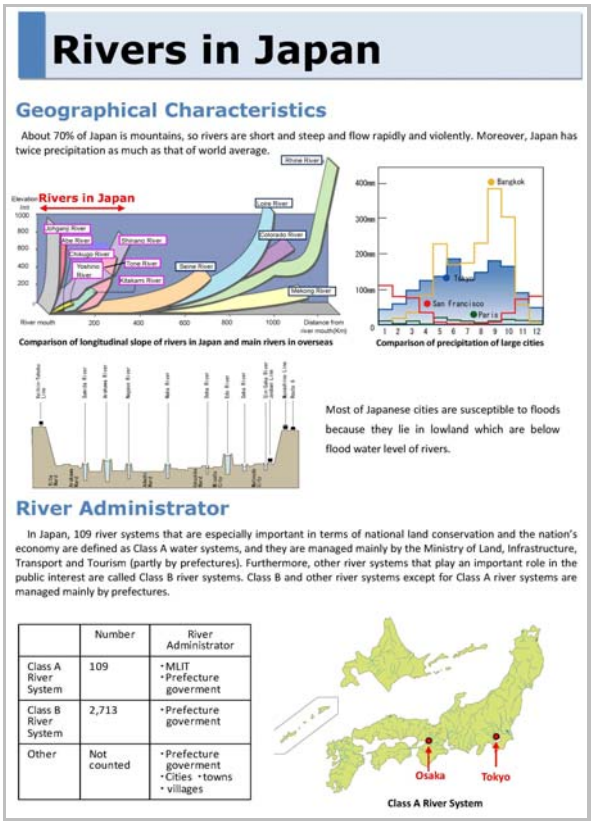
2005~2011: Creating an Eco-friendly River for Each City(50 sites)

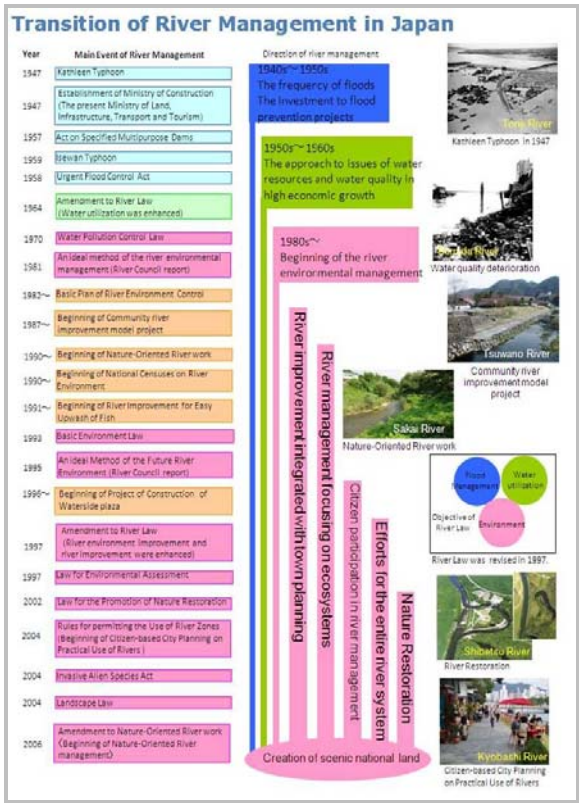
2010: Establishing Comprehensive River Improvement Plan(4 major rivers)

Nakdong river (4 Major Rivers Restoration Projects)

vinyl house removal

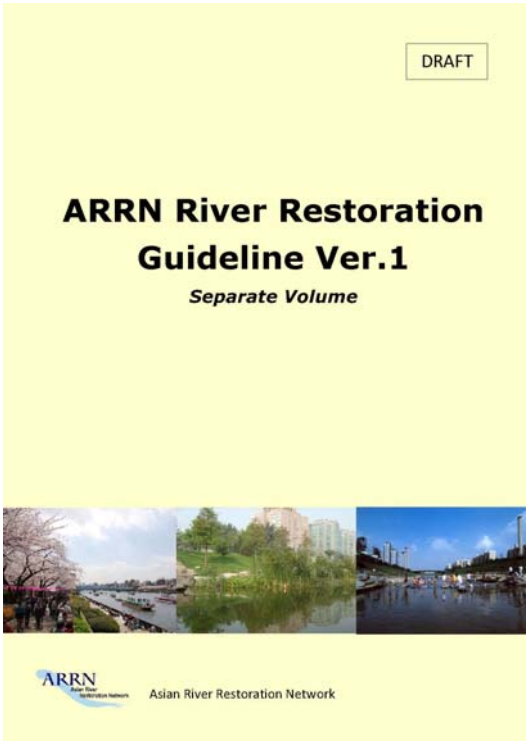
This slide shows Japanese rivers. So, similarly Japanese rivers are quite steep, and they have alluvial fans and plains. 50% of the population and 75% of the national property are on these flood –prone alluvial plains. There are common geographical characteristics in rivers of member countries but also proper features in each country.





Before we listen to the opinion of the panelists, I'd just briefly summarize the session, the previous session we had. It is the 7th International Forum of ARRN, and we discussed and obtained several good models in several countries. The title of the session is "Excellence in Engineering Practice in River and Waterfront Restoration".

Inside our handout, we introduce the modern examples of river restoration. Basically, the successful examples of river restoration works mainly in the member countries, including European and American experiences.



Handout

http://www.a-rr.net/jp/info/letter/docs/ARRNguideline1-separatevol.pdf

ROLE OF NETWORK

Role of River Restoration Network

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

In this roundtable meeting, the major topic, as I mentioned, is Role of River Restoration Network, and through this network, I would like to pass off technology and knowledge on river restoration to the member countries and also to the world.
First, I would like to ask four panelists to give us your opinion on what will be the role of river restoration network and your suggestions in the future for river restoration network, probably in a couple of minutes, because I'd like to have sufficient time to discuss among panelists and also the participants.
So, first, I'd like to ask Dr. Bart Fokkens for your comments and suggestions on the role of river restoration network.

[Dr. Bart Fokkens (ECRR president)]

Thank you very much Mr. Chairman. I will summarize very briefly the role of network for river restoration, the one being as three or four directives; first of all, bring people together who are active in river restoration and let them share their experiences. And that is still the main objective, to my personal opinion of network.
It is often up to the people themselves how they share it, but the network can of course serve as a source of exchange to a very high extent; that's number one.
Number two is that you go a step further, that's what you are doing by developing guidelines. We found it extremely difficult in Europe to develop guidelines, so we have different kinds of guidance tool and it does not give exact guidelines how to restore, but it guides you when you want to restore, the objectives you want to achieve; that's number two.
Number three is when river restoration is going on, trying to find what are the best practices, the river restoration project with the best results, first of all ecologically, but secondly, also economically because it is very important that you are cost effective in relation to the effectiveness of the ecological results you want to achieve.
And the fourth one is, that in some way you need to report about it. We have of course some database, but you should make available the information about the best practices of river restoration in relation to an ever-developing guidance tool. Thank you very much.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Thank you, Dr.Fokkens. He mentioned about the major four points. I think those are good points for us and also for the audience to discuss later. Let's proceed to the second panelist, Dr. Dongya Sun from IWHR.

[Dr. Dongya Sun (Secretary General of CRRN)]

First, I would like to thank greatly to the ARRN secretariat. You have done some memorable work for this kind of symposium and also this roundtable meeting. And also, I would like to thank the local secretariat of Korea. For this meeting, in relation to the role of river restoration network, I trust the thing about that – I fully agree with Professor Fokkens that we should organize the related people, and we should organize the platform for people from different fields to participate in our work and discussion.
Second is to develop some guidelines. We should put forward suggestions to the government officials on how to do the planning of river cleaning work, how to do the flood control budget. This kind of work I think we should put forward not politically but technically, because in China now we have to plan flood control and also river cleaning works for medium-sized and small-sized rivers, we have many kinds of rivers. But, if the technical approach is not appropriate, then we will make mistakes that the Europeans made maybe 30 years ago. In some provinces, some people used the conventional methodologies for river cleaning, used very hard, concrete, revetment et cetera.
So, at this moment, I think for China, we should learn from a platform for Asian countries, also European, American countries, too. From their experiences, we can put forward suggestions to the government official on how to do the work for the future.
Also, I think – I just consider that if we have a very effective platform, maybe we can discuss and organize one or several international research projects together all to do some demonstration project in one country on several rivers.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Thank you Dr. Dongya Sun. We had the suggestions to the decisionmakers – or

recommendation to decisionmakers. Then, I'd like to move to Dr. Shirakawa.

[Dr. Naoki Shirakawa (Technical Committee of JRRN)]

I am thinking about two points, one is the meaning of networks in Asia. So, Professor Tamai showed some characteristics of rivers in Asia, and some of them will be different from Europe, but some components of river restoration will be common between those European countries and Asian countries. And, each country; Japan, Korea, and China have different characteristics of rivers and also the common characteristics.
So, I wonder which components in Europe can be applied to these countries commonly, and what kind of things we have to think different from those European countries. And, the networking in three countries will give some ideas about the commonness of our rivers in Asia, but we cannot do the same thing in Europe.
And another one is about the motivation, motivation through restoring, for river restoration and also the motivation for the network. In the last session, in the international forum, I was impressed by the lectures from Dr. Fokkens that he said in Romania, the motivation for the river restoration was the flood. And the flood is a very important problem in Asian countries, maybe I think it's more important in Asia than it is in Europe. And, even in Europe, there are floods which motivate those governments to give such kind of funds for river restoration.
So, it can be thought as a good motivation for Asian countries also. And I wonder what kind of other motivation for the river restoration and also for the network can be presented in our Asian countries.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Thank you Dr.Shirakawa. In addition to the physical aspects, he pointed out the problems with the social or the cultural aspects of the motivation of river restoration. Then, Dr. Jang from Korea.

[Dr. Suk Hwan Jang (Technical Committee of KRRN)]

Thank you Professor Tamai. I'd like to say that the host of the Asian River Restoration Network is to gather some ideas or gather some common sense from the comparison of each country's cases.
And, I wonder, the first thing is how we can combine or find common sense among each country's restoration techniques. For instance, the Korean Rivers are a little different as Prof. Tamai has explained. So, we need some ideas for the comparison among the countries. And, I had some questions to the previous talks which, for instance, Dr.Fokkens gave to us. I wonder how the European countries they merge or incorporate under different laws and regulations among the countries which belong to one large basin, and how to distribute the budget.
And the second one is, I would like to suggest to add a supplement to an article in the guidelines of each country, on the regulations and the design criteria, so then we could compare how the other countries do. So, I think we should – if we can, I would like to suggest that items or the articles of that kind.
And I would like to show one thing of the Korean River Restoration Network, what we call is the transition time because operating body was changed and switched to a new system. Mr. Lee on the chair, he is the new chair of the Korean River Restoration Network. It is decided that the Korean River Restoration Network will be a special committee in the Korean Water Resources Association; that's for my comments. Thank you.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Thank you Dr. Jang. He pointed out the importance of scientific guidelines and suggested to add supplements for complete understanding from technical point of view. He raised a question about responsibility for budget and technical matters of a project among member countries in case of international rivers. I think this problem is also concerned with the management of international networks, because we are involved in setting up the guidelines. Dr. Fokkens mentioned on river restoration of an international river. I'd like to point out the importance of timing how to move ahead through a couple of phases to the final phase of river restoration.
Now I'd like to introduce my co-chair, Dr. Lee Bong Hee. He is from the Korean River Restoration Network. So now, Dr. Fokkens, would you give your answer or comment on the question raised by Professor Jang in the case of a big river basin, how to share responsibility to decide a common goal among the members from different countries.

[Dr. Bart Fokkens (ECRR president)]

In relation to the responsibility and how to deal with the project, except from the Danube Basin, there are a few countries that are not listening to EU, but they also consider by themselves. All countries have the same European directives they should be implementing.
What I did tell so far these days is that within these directives it is also stated that when they are in one basin, there is, to a certain extent, a common responsibility, but they should agree about the common approach in the basin, but each country is responsible for its own part in its country. So, for example, in the Netherlands, with the climate change, we face quite a lot of flooding, and that can be done something in Switzerland, something in Germany, but we had the most difficult problem to solve also in relation to sea level rise. We are responsible for that. So, it's not one budget for the whole basin; it's one plan for the whole basin, and

each is responsible for his own; that's the first mechanism.
The second mechanism is that the EU is willing to fund in relation to the economic situation of the country. For each part of plan of the total river basin, the country should make of course the benefit analysis because when the analysis shows that there will be great benefits, but they cannot make the cost then they cannot apply. And this means that in case of The Netherlands, we are a rich country compared to other countries, but we have a fairly high cost in relation to this specific situation that even based on the cost benefit analysis, we cannot apply from someone. So, that's the mechanism. There's always not enough money. That's the other situation of course because we want to implement, if possible, everything within the 5 years; but if it is not possible, make it 10 years or 15 years or 20 years. That's also a kind of political discussion, but I explained, as far as I know, the mechanism used.

[Dr. Suk Hwan Jang (Technical Committee of KRRN)]

How about design criteria? Does each country has each design criteria? How can that be as the mean satisfying to all?

[Dr. Bart Fokkens (ECRR president)]

Also in the Danube Commission, but also in the Rhine Commission, and there are other international ones who are not existing, their objective is to come to common agreed guidelines. This is not always possible. And then, the politics comes to solve the problems between two or three countries, but the process is such that they try to do the – almost to come to common design principles. And sometimes, there is not enough known how to come to these principles, and more research is needed. And, then you come in cyclic process and then this research will not be done by one country but that will be joint research because when you make a joint research, you have also joint results and joint principles.
So, now I'm talking about process in the Rhine Commission for 50 years, for example, where this is quite common, but this needs to be developed in the Danube basin, for example. So that's why I always talk about these two because they are in a very different stage of development.
So, I want to add one thing. You said also that there should be done more about promotion for river restoration. I think there is a difference in these countries and in EU. EU makes more political lobby and promotion maybe, and we make more promotion through the people wanting to implement awareness raising in the 27 countries because we have the policies, we have the legislation; the plans are also in all countries more or less there.
But now, if you come to action, then you need to approach all the different organizations involved. So, our next campaign for the coming theme in EU will be awareness raising to specific targets. Thank you.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Thank you. So can I summarize the mechanism? So target ,you say, should be common, among members of international committee, but in the implementation phase or the action phase, the cost and technology applied, in certain sense, will be decided by each country where the actual implementation goes on. Is that the major mechanism?

[Dr. Bart Fokkens (ECRR president)]

Yeah.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

So, dear panelists, do you have any other questions to other panelists?

[Dr. Naoki Shirakawa (Technical Committee of JRRN)]

I have one question to Dr. Fokkens about common goals or common objectives. For something like water quality problem common goal can be set easily, but for something like ecosystem rehabilitation, I think it can be different. It can be a local goal, which can be set for each part of the river when we think about very large river basin. For the River Danube, for example, do you really need a common goal for all the Danube? Can it be a local goal which can be set for each part of the river?

[Dr. Bart Fokkens (ECRR president)]

I understood your question, I think. The common goal is not a common goal for the very high level. Of course there should be a kind of strategy and everybody should agree with the strategy. But finally, the common goal is an action plan for all the basins, and the action plan should be built up in the countries, not only in one country, but maybe on a specific river stretch. But there should be first a kind of vision and strategy that direct this certain minimum requirements that you should fulfill. Then, the countries themselves they make their plans and that the plans altogether will be good for the basin in one plan, and this plan has to be agreed by the international committee, but it's built up bottom level that should fit in the strategy, that's why the process. And the European countries had about 8 years' time to fulfill this process to come to integrated river basin management plan for the river restoration. And still, it has not added optimum quality because they need to revise this now to a certain extent every year, and there is a cyclic process of 5 years. But it's always better to have a plan with a quality of 80%, commonly

agreed plan. And in the future, you need to achieve better result of the plan as well. But as bottom up and strategy top down that should beat each other in something.
And then, you come to quite other aspects, you come to the stakeholder. How do you deal with the stakeholders? How do you guide such a progress? You are talking about technical aspects, but when you go to stakeholders, they are not aware of all these technical aspects. They have their own interests. How do you value interest of stakeholders? And that can only be done by cost benefit analysis, and we didn't speak much about it these days, but this is becoming very, very important recently in our case, but I think also in your countries. First you start on few projects and much research, then the investments are not so high. But when you look at all benefits in your countries, in our country and going on really to invest in ecological improvement, huge investments are needed. The governments are willing to finance when we have cost benefit analysis and can show them that investing that money is efficient, but we are just at the beginning of that process.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

I think Professor Jang mentioned how to approach to the final goal. And, in the Korean case, which has the four major rivers, the first restoration work is going on, and how the decisionmaker or the central government decided such process, for instance, first phase, second phase and third. Especially, how did you decide, for instance, the extent of intermediate goals of the first phase and the second phase? What is the decision criteria about the required time or the final goal in this intermediate goal? Could you please explain your experience in four major river restoration projects in Korea, Dr. Lee Bong Hee?

[Dr. Bong Hee Lee (Secretary General of KRRN)]

I understand, but Dr. Chang Wan Kim in the floor answers your question. He used to be in charge of master planning stage of four river restoration projects.

[Dr. Chang Wan Kim (Former KRRN Secretary General)]

The four river restoration projects started 2 years ago. At that time we had a new president. He promised to make some navigation channel through the four rivers, connecting four rivers. The people did not support the navigation channel. Actually, the environmentalists were strongly against that project. So, the government had to change the navigation channel project to a more sustainable project for the flood control, and water use, and ecology. So, flood control is the main target of the river restoration project. But actually the best way for the flood control is to enlarge the breadth of the channel, so make a wide channel. It's very, very difficult to purchase the land. So, the other alternative is the use of space inside the channel. So, we need dredging. After dredging works, the normal water level should be draw down and also ground water draw down together.
So, to protect the drawdown of the normal water level and ground water level, we need to build some weirs to make water level high for the user of water. So, we proposed to install several weirs, but the distance between the weirs becomes shorter. The weirs height will be decreased, but the distance is also a problem. So, we usually use the distance between weirs more than 15 kilometers, so the height of weir should be decided under 15 meters. Then, we proposed some mild slope for low flow channel. This means the mild slope did not need some embankments using the concrete, so we put some vegetation in the mild slope of the river channel. So, next one is some room for the vegetation or something like, planting trees. So, we would like to enhance the ecological sustainability, and we did not make a shortcut, did not. Usually, we use some channel meander naturally. So, the river restoration network project will be finished in the end of next year.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Thank you. So now, I'd like to open the discussion to the floor to receive comments or opinions on the role of the river restoration network. First, I'd like to ask Dr. Michel Leclere. You are from Canada, and I think we have only one – say this one from North America. So, could you explain your opinion about – including your experience in river restoration and also the suggestions to the network?

[Dr. Michel Leclere (Canada)]

I'm not really prepared to answer this question about river restoration, but actually, when you look at a river in Canada, the main restoration project addresses rather water quality. Because if I take as an example, Saint Lawrence River, you can figure out that this river drains between industrial complex of North America, Great Lakes in Chicago, Detroit, Toronto, Montreal, and all big cities. And, each of these cities release a lot of contaminants, and there has been a major effort around the 90s to improve water quality and almost 90% of the contaminants, heavy metals, and also the nutrients has been – not nutrients are 20%, but industrial waste has been removed at 90% level, and this is a major effort.
In some areas, some river that has been, channelized by concrete walls in the past, just to make this river look like La Seine in Paris. These walls have been removed. Especially in the Québec City, the river where these walls have been removed, and the slopes of the banks have been smothered and re-digitalized, but still there are

some problems with use of water. Huge amount of water goes for drinking and then, we still have some problem of minimum flow to maintain ecological features. And, maybe by doing some diversion from neighbor basin to increase the flow discharge, I don't see any solution to improve ecosystem or natural aspects of river without diverting water from neighbor water basin.
But, in my mind, I'm trying to figure out some river that would have been artificialized as much as some of these rivers I saw; for example, the one here in Seoul where the weir has been removed, that's major works, but this kind of, I cannot speak for North America in general, understand, I don't – North America is a continent but I don't know what's happening elsewhere, but Canada is still a country where nature is everywhere. The population lives in a diameter of 50 kilometers north to the United States border and the rest is wild forest.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

So, do you have any declarations from ecological point of view, do you have some, for instance, central government has some rules, regulations embodied in the view in Canada?

[Dr. Michel Leclere (Canada)]

First of all, the federal government is deeply involved in the improvement of river. But as I said at the beginning, it addresses rather the water quality problem. Because this is one way to improve the ecosystem. I don't know if my answer corresponds to your expectation, but that's the best I can do.

[Dr. Bart Fokkens (ECRR president)]

Could you also answer the second part of the question? What's your opinion about the network you presented, the Asian one, the European one. These are people who are active in river restoration because the river restoration, the second part of the question was how is the situation about river restoration in Canada, and what's your opinion about the additional value of such river restoration network because that's the objective of this discussion.

[Dr. Michel Leclere (Canada)]

We can share the experience that's quite good because that's really complex to restore the river, and having this kind of network is certainly very good.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Well, as you mentioned, one good example is Saint Lawrence which is an international river, and you mentioned that the Great Lakes that is in the United States, and probably majority of the pollutants come from the United States, so I would say under such….

[Dr. Michel Leclere (Canada)]

What I can say for a larger length, for example, Saint Lawrence River, there is a mixed international recognition formed by two countries, Canada and United States, and they meet several times a year to achieve multipurpose management of river, flood control, and more recently, in the last 10 years, the management plan that let's say was firstly proposed in the 50s, so 60 years ago, that was applied as is let's say for 55 years. This plan only has main goal to protect against floods and control the floods. Second, to allow navigation as much as possible, and maximize also hydroelectricity, but the ecosystem was not considered in this management plan.
So, 10 years ago, there has been an update of this management plan, trying to incorporate objective of improving the ecosystem, wetlands specially, and it's been a huge work. My colleague worked a lot in lobbying this effort, and he proposed several measures to improve. And, mainly what I can say is that the way to improve the ecosystem is to allow higher variability of flow discharge, especially for maintaining wetlands and areas that were in the process of drying without floods, that's what happened. So, wetlands now are being in the process of improving, but you can figure out that that's a huge, huge economic concern, Saint Lawrence River. So, it's not easy to combine these conflictual goals, but there is a will to make it, and it's an international effort from both countries.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Thank you.

[Dr. Suk Hwan Jang (Technical Committee of KRRN)]

I'd like to pose one problems. Let's think about the definition between the conservation and implementation or improvements in river restorations because it is very difficult to make a decision when we are doing some project, river restorations, some NGO insisted the river to preserve as it is, but the government wanted to develop or the implement, so do you have any ideas to make a decision between two?

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

By preservation and conservation, you mean, no action in some sense?

[Dr. Suk Hwan Jang (Technical Committee of KRRN)]

In some ecologies, some NGOs, always want to be as it is. So it's very difficult to make a decision and very difficult to persuade them.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Dear panelists or floors, do you have any suggestion on this?

[Dr. Zhang Yimin (China)]

Thank you. I'm from China. I am pleased to come here. I know the ARRN; but it is the first time to participate. I'm very interested in river restoration. I think, recently, we pay more attention to large rivers, but it's preferably in China, we need to pay attention to smaller ones, especially for rural or city rivers.
And in China, now we pay more attention to increase the water quality of the river, and we take so many measures to the pollution source control. I think it's the first for restoration of the river. And then, I think there exist, so many techniques but both effective and economic techniques, I think are very important. It's very important to share the experience of the scientist. I think it is the best way to communicate through our platform. The ARRN I think is a good platform.
We can communicate through the conference draft, but I suggest, if we have opportunity to unite, to obtain some support from the government or some fund to have demonstration somewhere to solve the local problem of some rivers.– I think maybe this is a useful way to co-operate. This is my suggestion.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Thank you. So, I would like to return back to the question by Dr. Jang.

[Dr. Dongya Sun (Secretary General of CRRN)]

I want to say something about the panelists' some questions. Let's in fact say something from river restoration concept. In China, just the meaning of restoration is not the very meaning as it is in English. We cannot restore a river in the historical state, that's amenable. But in Chinese, we got to use words that's similar in English the meaning of rehabilitation. This is one aspect.
We can do. What we can do? We can do the conservation to keep its present state or condition. And also, we can do some active measures. So conservation is a kind of passive measure, but we also can do some rehabilitation work from active aspect. And that in turn we think that we have conservation and also rehabilitation for river ecological recovery and something.
And also, we have some other planning for ecological conservation work. But, in my opinion, in this kind of rapidly developing country like China, we need some hydropower. There are many urban residents in the water supply farmland irrigation. So, in turn, we cannot simply say that for the purpose of river ecological conservation, we should not use water or take the water, it's not eligible. So, in China, the eligible way for us is to do work for two purposes. One is for ecologic aspect and the other is for social aspect. We have to consider, at the same time, these two aspects.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Thank you.

[Dr. Bart Fokkens (ECRR president)]

I would underline the approach very much because also in our situation, I know it from many places on the road. In most cases, you cannot restore the historical situation, but river restoration, in my opinion, is not to restore the historical situation. River restoration is that you study maybe from the past or you study from still a different situation that are in certain countries how the processes are, and you are able when you know the system, you know how to restore the processes, and that is what we call river restoration. Then you need not restore the river as it was in the past and maybe we develop new techniques because we know much more about geomorphology and about ecohydrology et cetera , through conferences like this.
We should use science and knowledge that all the scientists here can give. If we can use outputs that are brought forward in this conference in river restoration we can restore ecological processes to a certain extent even when the conditions are very poor. And when we are able to restore the processes, then we could contribute to – the habitat restoration to contribute to the ecology. This should fit in, of course, the kind of ecosystem approach and ecosystem system. Being apart from restoration in China and even in Europe and many places, if you consider in your situation that you can restore the river situation as it was 50 years ago, that's not possible, but that is also not needful. There are other possibilities, so I agree with you very much.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Thank you. As for the restoration, usually, we need to discuss about the goal of restoration. So, as I mentioned, you see that the goal is to restore river processes in, let's say, 50 years ago or 100 years ago or more ancient state. We need, I think, in a certain sense the social consensus. I think that the goal would be determined through that. And then, if we see that we have say the zone or the rivers which are quite rich in nature, in that case, probably, no action; this solution will be selected.

GUIDELINE

How to develop Guideline for river restoration

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Next, I would like to ask your opinion about the guidelines, and also in relation to the guidelines, probably the very important question or subject is how to define, for instance, the ecologically sound condition of the eco-system. We cannot evaluate ecological soundness from technical point of view or economical point of view. Probably this is difficult, but already it is mentioned that it's a very important subject in river restoration, and also to obtain the common guidelines for river restoration. So let us consider at first the evaluation or the value of ecological soundness or good, in some sense, eco-system services. How do you think about the evaluation techniques or how do you consider on these? Are there any comments or suggestions?

[Dr. Dongya Sun (Secretary General of CRRN)]

I would like to say something first for the guidelines. Because this kind of guidelines are planned for the public of different countries, I think guidelines should show basic concept, make, common concept clear. And then we can put forward some aspects that we should totally work when we do the river restoration project. Some aspects we must list in the guideline, we should do – from this aspect do our work. We need general aspects we should carry out restoration works and data collection, including hydro-morphological aspect. We should consider some specific aspects, if the technique is very successful concerning, such as, the environment, vegetation et cetera. So, that's my suggestion.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Thank you. So, in this roundtable meeting and also in the previous forum, you know, we discussed the excellence in engineering practice. And this is co-located with the IAHR symposium on ecohydraulic. During the symposium, these two meetings were held. So what do you think about this symposium? Can you hear about the new research outcomes on new technology or some innovative research articles, through the symposium? So, in some sense, you see, to have this meeting during this symposium is quite beneficial to know the recent outcome of the advanced research or technology. What do you think? So maybe we can, in some sense, learn quite a lot from new advanced technologies and then adopt these new aspects or new concept and the new technologies into river restoration.

[Dr. Bart Fokkens (ECRR president)]

Yeah. I'd like to explain a little bit from the restoration, but it fits in into your question. As I said before, it is very difficult to make proper guidelines or a real guidance tool, but actually, the guidelines for –what I explained Thursday, the good ecological status. And, this differs from place to place and situation. For water quality, it is much more easy, but still it needs quite a lot of intercalculation to find out what the good status is from a chemical point of view; from an ecological point of view, it's much more difficult.

And then the things comes with this ecohydraulic conference because the more that can be understood of this type of processes and the action between the biota and all these aspects, the better we understand, the better we can formulate what the good ecological status is. Still it's depending on the type of place where you are, and that's why we selected ecology. So, in the different ecologies, the good ecological situation will already be different.

So, the good ecological state is, at the moment, related to the ecology a little bit fake in Europe, but we have some guidance on how to develop but the more research and the better research is available and the more techniques become available to introduce the restoration technique, the better it is and the better we can define what the good ecological status should be in a certain situation.

So this is scientific approach, a kind of minimum level now, and the national government, they need to make sure that the situation from 2001 did not get worse. We start off with what you should do all favorite techniques to improve the situation and to attest it. So, that's our approach. It is not a guideline. It's an approach. It's a concept. So, I feel a little bit of difference in the approach in the Asian region where they really develop guidelines. It is quite different, but conceptual, there is also some difference.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Thank you. So, what I want to say is, when we think about some standard concept or say the

general concept, which we want to have in the guidelines, in that case, as Dr. Fokkens mentioned, in the initial version level, we need to start this on the current knowledge. Then, we see the research advances, and then you know the revised version, and also we can introduce new findings to obtain the revised version. At first we seek for the general comments, and then in addition to this foundation the essential part will be developed, as you already discussed, here's each country has difference to a certain level. Each river has its own characteristics, so then, you see, some peculiar characteristics of each region or each river can be added to this foundation of common, general parts…some comments?

[Dr. Suk Hwan Jang (Technical Committee of KRRN)]

To make the guidelines and to restore the rivers, it is very important to assess and evaluate the rivers at first. So, I think we should pay attention to develop not only the physical indices but also the ecological indices. So, before restoration, we should study current status, or we need a state-of-the-art report, and so this is the second or third grade soundness of the eco-system. So, there are some indices developed, I know, but it's not used commonly all over the world. So, I agree that the condition is different in each country, but on the common, we should develop certain guidelines in Europe or in Asia as such.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Could you mention your name and affiliation?

[Dr. Jin Yong Zhao (China)]

I am from CRRN. In the past years, we have done some works, some restoring works for rivers and their regions. We applied basic theory and also executed some demonstrative projects. But, during the demonstrative project, some of them went to court because many local governments have no standards to evaluate the project. So, it is difficult to get money or get funds from the government or local foundation. So, I think, the guideline is a very useful tool for some people of the region to get some opportunities.
But in China, there are some different situations because in China, the project must be implemented based on certain standards, certain national standards. So if we have no standards, the project is difficult to be implemented. But I think the guideline is in a primitive stage yet. After introduction of the first version of guidelines and after many prognosis, we can establish the national standards probably. On that the rural preservation will be widely implemented.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Thank you. So, Dr. Zhao suggests that, the guidelines, when we prepare, in that case we need to revise with, say, 2-year interval.

[Dr. Michel Leclere (Canada)]

I have some thoughts maybe to add. When we talk about river restoration, maybe we should define what we mean by river restoration because for sure, it's most of the time, modification or human impacts on rivers becomes more or less irreversible. When you look at, for example, big dams or – unless you remove the dams, it's difficult to envisage some restoration of the river as it was. So we – I don't know if it would be the good word, but I will say that rehabilitation law or restoring some features or some aspects, natural aspects of the river is going in a good direction, but to restore river as it was, it's a new topic.
Concerning guidelines, I feel that we are at the point in history where there are a lot of must dos that can be figured out without any guidelines. Because the situations are so different from a river to another that if you look at a specific river, sometime we know that something must be done and for sure, we will need some conceptual framework to do the work on this river, but are there some generic rules that could become general guidelines. I'm not quite sure except maybe they could be very general, for example, restore or improve water quality or remove the walls or… For example, in North America and in Europe too, there is a huge effort to restore the connectivity of the river, just to improve the migration of fish, that's in a sense guidelines, that's general objectives that are generic everywhere, but we are still building dams and weir. Maybe the first rule will be stopping degradation of rivers.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

For instance, the terminology appears in the guideline, for instance, rehabilitation is applied to local change, and also, it doesn't improve the recovery of ecological function. So this is the first level of environmental improvement. And then restoration includes, I think, as far as I know, includes the recovery of ecological function.
And, for restoration if we'd say this covers the whole river basin. So scale-wise and also action wise, I think, we have definition of rehabilitation, restoration or full restoration, for instance. So, these terminologies have been usually attached to the guidelines.

[Dr. Hong Wu Tan (China)]

I'm from IWHR, China. For the guidelines some suggestions, firstly, I want to ask some questions. Firstly, what can we learn from other countries? – Yes, others, in fact refers to the European Union

and the USA or Australia, because now we are Asian River Restoration Network. So, up to date, the river restoration of Asia is not most advanced – it must be the USA, European, or the Australian. So, the most – first question to summarize, what can we learn from other advanced countries? This is the first question.
The second question is what we can share among ourselves; in China, in Korea, or in Japan? Japan is the most advanced in river restoration among these because Japan has put forward the river restoration. And, I think to make the guideline we should summarize by ourselves improvement in this area.
And, the third question is, what is our special program of Asian rivers is. And I think the most difference among other areas is perhaps the much denser population in Asia. For example, in China, has the densest population. Japan has, also very, very dense population. So, maybe, this is the difference.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

So I think your first and second question depend on the motivation of each individual how to utilize network or knowledge accumulated so far, and the third question, it is closely concerned with the guidelines. For instance, the guideline, we wish to provide the basic concept of how we consider the nature or how we see the impact of the human activities change or modify the nature. Such knowledge or understanding forms the basis of guidelines. So through guidelines, I think such part you can understand as fundamental common knowledge or understanding of restoration. Do you have any comments from panelists?

[Dr. Bart Fokkens (ECRR president)]

May I make one remark? Again, you mentioned as you say you should look to the most advanced countries and learn from them. That might be true. We are in a different position. On the other hand, my experience is that still, when one country is more affluent than the other, then the exchange of information and learning from each other tends to be mutual.
We can spread something that's going on in these countries. And as you said, your country is densely populated, and there are circumstances that differ, but maybe, we might face problems you have now already, in our country in the future. So, when you find a solution in your country, we can transfer this to our country. That's why we organized joint projects I've already presented about the cooperation between The Netherlands and China. This was not only to learn in China from what happens in Holland, but also to learn in Holland what may we could have in Netherlands, to learn from China.
So, you might be right that you can may be learn more, but still, I think, it is mutual, and it should be mutual.

[Dr. Nobuyuki Tamai (ARRN Chairperson)]

Thank you. So, the time is approaching to 5:30, and this is the closing time of this session. So, I'd like to summarize this session, the title of which is "how to develop technology and guidelines for river restoration networks".
As all panelists mentioned, including participants from the floor, the network for exchange of technology and concept and from the study clarifies, you see, the difference from the physical, cultural, and historical point of view. There are such variety and sometimes diversity, it is quite important. I think that it's a common understanding.
But still to do that, to deepen the understanding, we may have something that is still lacking, for instance, the evaluation technique, for instance, the economical value, how much good environment is. This economical value is critical for project evaluation for restoration for ecological soundness. Such evaluation techniques are still unknown or in the primitive stage, I think. So, still we need to enhance the advancement in research area and we can reflect this advancement in research and also discussions on the networks and also to real implementation of the river restoration network.
So, the ARRN wants to make efforts corresponding to these missing points and also the merit of the networks. Thank you very much, especially I would like to appreciate our panelists and also participants here for lively discussion creating deeper mutual understanding and successful outputs in this roundtable meeting.

Thank you very much.

Asian River Restoration Network

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Japan River Restoration Network (JRRN) has a role of ARRN secretariat since Nov. 2006. Secretariat of ARRN and JRRN is operated by ***Foundation for Riverfront Improvement and Restoration*** and ***CTI Engineering Co., Ltd.*** as joint study on development of international information network of river environment. **http://www.a-rr.net/jp/en/**

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