

RESEARCH REPORT

COMPERATIVE STUDY on COMMUNITY PARTICIPATION and
ECO-ENGINEERING for RIVER RESTORATION
in TONGYEONG, KOREA and in UGM-YOGYAKARTA INDONESIA

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Regional Center of Expertices (RCE), Tongyeong, Korea

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Abtract

The Indonesian River Restoration Movement has been running since 2014 and succeeded in moving and supporting more than 250 river communities in almost all major cities in Indonesia. Activities of river restoration movements include the socialization of the ecology, social and economic value of the river, the cleanness and healthy river, and the empowerment of riverside community. The result of this activity has been able to feel a lot of interest in various cities in Indonesia. For the last 4 years the restoration movement improved quality of many rivers in Indonesia. Especially the solid waste in the rivers is significantly reduced and the awareness of the people. The research activity conducted in Tongyeong was focusing on the community participation and eco-engineering technology in river restoration especially urban area. Furthermore, the community participation and eco-engineering technologies implemented in Tongyeong can be compared with the similar cases in Indonesian. The study conducted by taking rivers in Tongyeong Korea; Jeongrang and Sejahtera-Park river for eco engineering and community participation study and rivers in Yogyakarta Indonesia; Belik river for Eco-Engineering study and Code river for community participation study. This 1-months study period was raft scheduled: the first week focusing on preparation, the second and third week for field study and results analysis and the fourt week for report and presentation. The result of this study consists the investigation report of Jeongrang, Sejahtera-Park and Belik river restorations, the interview report of community participation of Jeongrang and Code rivers, the presentation material of indonesian river restoration movement and education for sustainable development and book chater about the development of river erstoration.

1. Background

In the last 25 years the quality of rivers in Indonesia especially in the urban or city area is decrease dramatically. The quality of hydrology, ecology, morphology and the participation of people in keeping the river clean, green and healthy is low. But, since 2000 there were some river communities starting to develop, and in the year 2014 the Indonesian River Restoration Movement (IRRM) or Gerakan Restorasi Sungai Indonesia (GRSI) supported by community, government, university, NGO and other stakeholders has declared.

The IRRM has been running since 2014 and succeeded in moving and supporting more than 250 river communities in almost all major cities in Indonesia. This river restoration is designed by involving people/community living along river and has received the appreciation of Global Prize Award from UNESCO-OKAYAMA City 2016.

The activities of river restoration movements include the socialization of the ecology, social and economic value of the river, the cleanliness and healthy river, and the empowerment of riverside community. The result of this activity has been able to feel a lot of interest in various cities in Indonesia. For the last 4 years the restoration movement improved quality of many rivers in Indonesia. Especially the solid waste in the rivers is significantly reduced and the awareness of the people.

The research or study activity conducted in Tongyeong was focusing on the community participation and eco-engineering technology in river restoration especially urban area. Furthermore, the community participation and eco-engineering technologies implemented in Tongyeong can be compared with the similar cases in Indonesian. The study conducted by taking rivers in Tongyeong Korea; Jeongrang and Sejahtera-Park river for eco engineering and community participation study and rivers in Yogyakarta Indonesia; Belik river for Eco-Engineering study and Code river for community participation study. This 1-months study period was scheduled: the first week focusing on preparation, the second and third week for field study and results analysis and the fourth week for report and presentation. The result of this study consists the investigation report of Jeongrang, Sejahtera-Park and Belik river restorations, the interview report of community participation of Jeongrang and Code rivers, the presentation

material of Indonesian river restoration movement and education for sustainable development and book chapter about the development of river restoration.

2. Purpose

The community participation and eco engineering for river restoration are the topics that really interesting in Indonesia. River restoration movement in Indonesia now is really going forward. It needs to be developed continuously to achieve the restoration goals. The goals of river restoration in Indonesia are: the rivers are clean, conserve, healthy, productive and sustainable in use. Therefore it is important to learn the experiences of Korea in supporting the river restoration in the country. It will be then adapted to support the river restoration in Indonesia. The community participation and eco engineering for river restoration in Korea are the main topic to learn, to research and to study. The research or study results will be written as study report and also for presentation material for conference in Regional Center of Expertises (RCE) Tongyeong. The research study results will be disseminated in more than 100 cities in Indonesia due to River Restoration Movement Network. Furthermore, it would be also develop collaboration between RCE-Tongyeong, Korea and RCE-UGM, Yogyakarta Indonesia.

3. Research objectives

The objectives of the research are:

- a. To study the river restoration program and achievement in Tongyeong,
- b. To study the community participation in the river restoration in Jeongrang river and Code river
- c. To study the eco-engineering in river restoring in Jeongrang ad Sejahtera Park, Tongyeong and in Belik iver in Yogyakarta, Indonesia.
- d. To develop presentation material of river restoration for the RCE-Tongyeong conference.

4. Research impact for knowledge and society

- a. Gaining knowledge about community participation in river restoration program
- b. Gaining knowledge about eco-engineering and the implementation
- c. Collaboration partners for development of river restoration in Indonesia
- d. Report can be develop for journal/seminar as river restoration knowledge contribution
- e. Discussion among experts in river restoration can support the understanding about river restoration

- f. Knowledge sharing within seminar or discussion.
- g. Supporting collaboration between Korea and Indonesia especially on river restoration.
- h. Supporting knowledge and experts exchange between Indonesia and Korea
- i. Supporting the river restoration program in Indonesia and Korea

4. Schedule and Implementation

Week	Research Activity (10th Oct.-9th Nov. 2018)	Location
I	Literature study, preparation and research program development	RCE-Sejahtera Tongyeong
II	Field Study : Rivers in Tongyeong; Jeongrang river restoration and Sejahtera Perk river restoration. Preparing Results report	River Jeongrang and other river in Tongyeong
	Discussion with The Tongyeong- Government institution which is runs and responsible for the restoration program.	City hall Tongyeong,
	Discussion with community leader:about river and river restoration (how to keep river clean, healthy, conserve, safe, productive and useful-sustainable and how to restore damaged rivers how people use and construct the eco-engineering technology for river bank protection and costal protection)	
III	Anlysing the eco- engineering construction for river restoration in Tongyeong and Yogyakarta	RCE Tongyeong
	Prepare result report. Comparative study river restoration in Korea and Indonesia (reported in form of presntation material)	
	Prepare draft Research report development. Discussion with RCE Tongyeong staffs and feet back for the research and discussion for collaboration between RCE Yogyakarta UGM Indonesia dan Tongeyong Korea.	
	Finalization of the presentation according to the feedback from the previous presentation. Submit power point presentation for conference at 7 of Oct 2018 in RCE Tongyeong	
IV	presentation for conference at 7 of Oct 2018 in RCE Tongyeong	

	Finalization of the research report and submitted.	
	End of Program	

5. Result of Research/Study

5.1 River Restoration in Belik River RCE Yogyakarta Indonesia.

The investigation about river restoration in Belik river in Universitas Gadjah Mada, which is done before research in Tongyeong, can be found in power point presentation in Figure 1 and the full presentation can be seen in the attachment. The restoration in Belik river is functioned for restore the hydrology, ecology, morphology, social economy and regulation & institution. Furthermore this restoration aims to prevent the flood problem in the downstream. Therefore the research about evaluation of river restoration after flood even is conducted 2017/2018.

The construction damages after flood are very limited, it was only minor damage. The eco-engineering is already implemented and the result is quite good. The grasses planted on bamboo (eco engineering construction) on the river bank shows its stability. It shows that the nature-ecology-engineering is the best natural solution to protecting river bank

a. River restoration

Wisdom Park
RCE Univ. Gadjah Mada



Wisdom Park



Wisdom lake (1) and serounding (2&3)



Amphitheater (1) and Wisdom Tunnel (2)



Eco-channel(1), normal channel (2&3) and temporally wetland (4)



Selfie step, creek and bridge



Wisdom flood and sediment



Traditional Dwelling Gazebo



Research/Investigation on Impacts of flood (before, within and after flood even)

- Increasing flow velocity and water surface
- Sedimentations
- Damages
- Eco-Engineering



Flood Even 31 December 2013



Condition before flood even



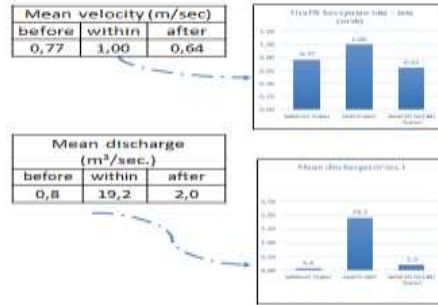
Condition before flood even



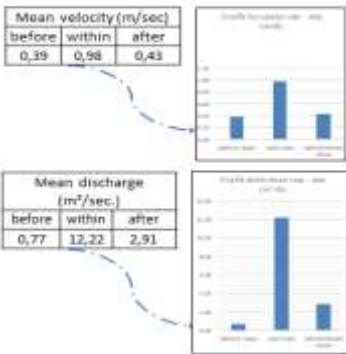
Water surface level Increasing water level



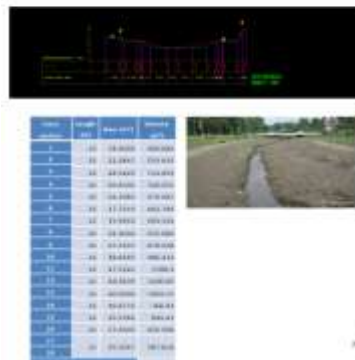
Velocity and Discharge Measurement (Increasing water level and discharge)



increasing water level and discharge



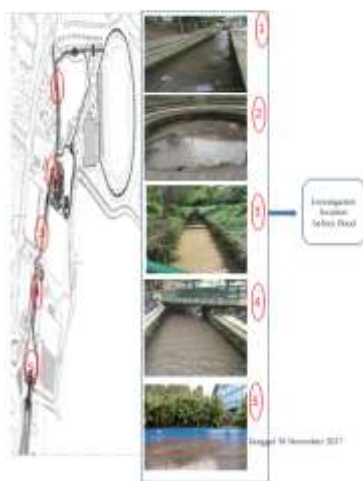
Water storage capacity of retarding basin



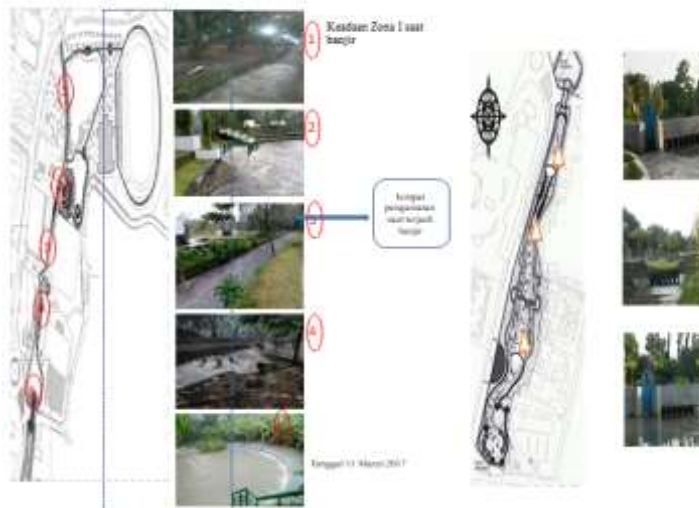
Flora in Wisdom Park, (Ketapang dan Talas) (12 November 2017)



Condition before flood



Condition Within flood



b. Eco-Engineering

Condition before and after flood



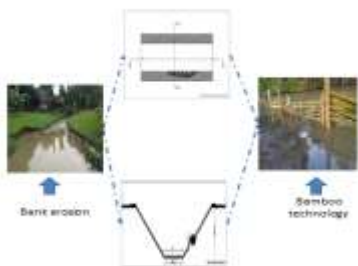
Natural recovery more sustain



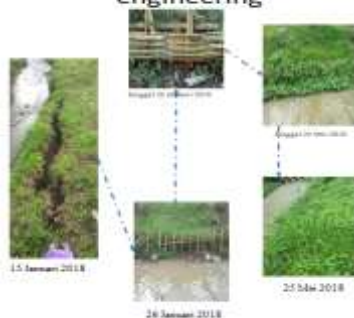
Eco-Engineering for bank protection



Eco-Engineering for bank protection



Good development of eco engineering



No development of eco engineering

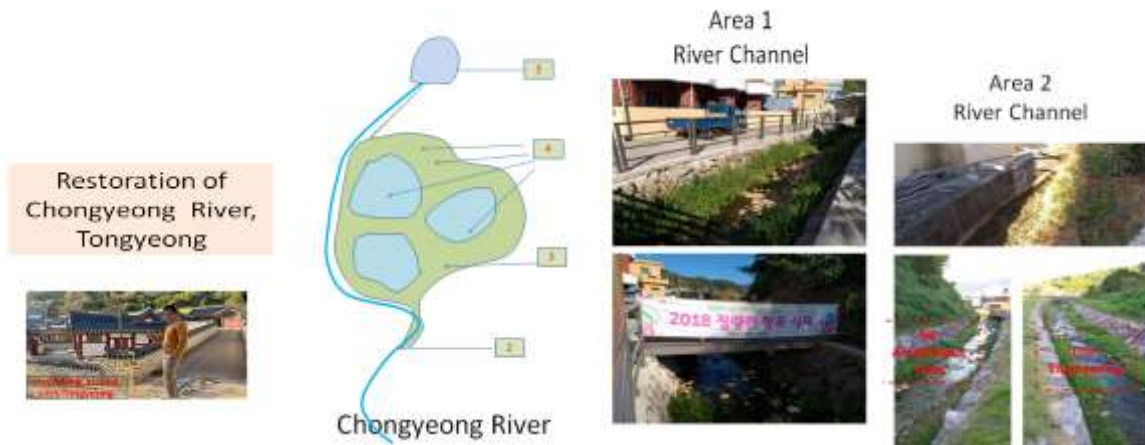


Solution : 1. Filling the erosion pool with soil or stone.
2. The bamboos must be arranged near the eroded bank.

5.2 River Restoration in Jeongrang river

The river restoration in Jeongrang can be express below:

a. River Restoration



Area 4 Wetland



Area 4 Wetland and pool



b. Eco Engineering

Area 4
Wetland and pool



Area 4
Eco-Engineering



Area 5
Dam in upstream



Island
to support the ecology (safe place
for Apes and flora & fauna)



Island is the most favorite place for
flora and fauna

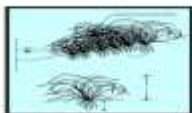
Rockfill Dam



Bank protection
with *hurbs*



Grass for river bank
protection



Bank protection with
rock fill and vegetation



Fishway
It needs fishway between two pools
to support fish population



It needs fishway
between two pools



5.3 River restoration on RCE-Sejahtera Park

a. River restoration



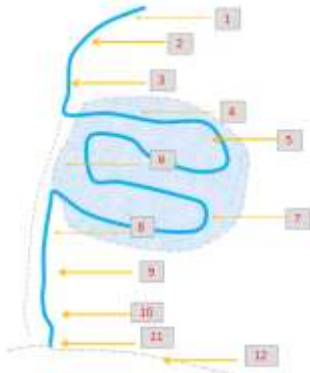
River Restoration

- Definition
- A measure/activity to bring back the function and condition of degraded river to its original one (Maryono, 2016)

Element to be restored

1. Hydrology
 2. Ecology
 3. Morphology
 4. Social
 5. Regulation
- 1,2,3 → Developed country
1,2,4,5 → Others

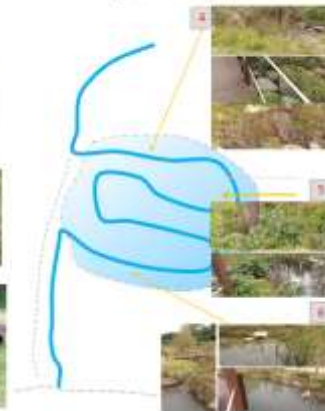
River in Sejahtera Park



Condition in point 1,2,3



Condition in point 4,5,6



b. Eco Engineering

Eco-Hydraulic Evaluation

- Eco means Ecology (flora and fauna)
- Hydraulic means static and dynamic of water
- Eco-hydraulic is an integrated approach (ecology and hydraulic) in analyzing problem

Condition in point 10,11 & 12



Ecology

- Flora : in downstream is too less flora



Limited flora

- Solution: plant along the river flood plain



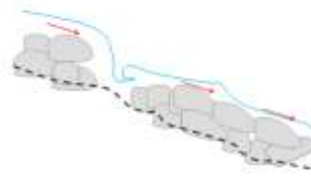
Fish migration.?

- Fauna : Fish migration...?
 - Stone is too big in size.?
 - Stiffness is well



- Connection wetland and creek & coastal...?

Flow velocity over stone too high



- Fishes could not move forward
- Solution:
Using small stones



Cylinder Culvert

- Fauna : Fish migration...?
- Cylinder Culvert is immersed



- Small fishes could not swim upstream.
- Solution: change or submerge the culvert

Frog and fish couldn't move upstream



Frog must move over the culvert or bridge



Step and pool

- Small fishes could not swim upstream



- Solution : make the channel/creek wider and the stone smaller

The restoration in Jeongrang and Sejahtera park river are equipped with wet land and in Jeongrang with dam as well. It means that the river restored more better compare to the original-natural condition. The comparison between restoration in Yogyakarta dan in Tongyeong can be explained as follows.

Topic	Belik River Yogyakarta	Jeongrang Tongyeong	Sekjahtera park Tongyeong
Restoration	Multy perpuses for restoration and flood control. It is needed to give fasility for fish migration	Ecology, Hydraulik, Wetland for water treadmen. It is needed to give fasility for fish migration.	Ecology, hydraulic, wetland for water treatmen It is needed to give fasility for fish migration
Eco Engineering	Made from bamboo and vegetations	Made from stone and vegetations	Made from stone and vegetations

5.4 The role of the Government

The questionere for interviewing the goverment institution which run the river retoration in Tongyeong is express bellow:

The role of the government to river restoration

A. Question about policy

1. Who has the idea of river restoration in Tongyeong
2. What are the aims of the restoration policy?
3. Who are responsible for financial support for river restoration?
4. When the river restoration is begun and when is it finished
5. How is the evaluation results of the restoration related to the goals

B. Question about Collaboration

1. Do the City Tongyeong has collaboration with other city in river restoration such a consortium
2. Do the City Tongyeong has collaboration with private sectors for river restoration
3. Do the City Tongyeong has collaboration with river community
4. Do the City Tongyeong has collaboration with University or expert on river restoration

C. Question about construction

1. How does the City Tongyeong start the restoration?
2. Who planned the river restoration?
3. How was the planning, did you use computer simulation program or physical modelling in laboratory?
4. How was the construction stepwise?
5. How was development after construction?
6. How is the flood prevention program if any?

5. 5 The Community Participation

The question for interviewing the community leader is express bellow:

The role of the community (River Community or Nature Conservation Community)

A. Question about understanding of people or community about river and river restoration.

1. Can you tell me what the function of the river is?
2. Can you tell me how important is the river?
3. Can you tell me, how was the condition of the river for 10 years ago..?
4. What did you feel when the river was damage or full of garbage and polluted?
5. Please explain me what is the river restoration?
6. Please explain me why we did river restoration and what for?

B. Question about activity and participation of the people and community

1. Who had idea to restore the river?
2. Do you organized the river community or the government or NGO set up your river community?
3. Is your community organization has legal papers?
4. How many times a week your community has meeting?
5. Do your community has fix program for river? Or you just spontaneously make activities?
6. Do you work in the community as volunteer or based one salary?
7. Do you care about upstream and downstream condition of the river?
8. What do you do for the other river?
9. What is your activity every day or week related to river?
10. How long have you been active as river community member?
11. How many person are active in the river community?
12. Do yot difficulties in organizing people in the river community?

C. Question about Collaboration and Network

1. How do you maintain the contact among community member?
2. How many institution have already been working together with your community
2. Do you know what is networking?
3. Do you have networking among river community in Korea?
3. What do you use for communication with other community in Korea?
4. Do you know to set up networking among community member?
5. Do you want to set up networking among community?

D. Question about river knowledge

1. Can you explain me what is the river ecosystem?

2. Can you explain me about fish population related to water pollution?
3. Can you explain me why flood some time is accure?
4. Can you tell me why the river drought is?
5. Can you tell me the different between natural river and man constructed river using concrete?

E. Question about Eco-Engineering

1. Do you know why in river restoration using eco engineering?
2. Can you explain some technologies to protect the bank erosion?
3. Can you explain the number flora and fauna population increase after restoration?
4. Can you explain the best eco engineering technology to increase the fauna (fish) population in the river?

5.6 Result of the Interview

The result of the interview with the government and the community leader in Tongyeong an Yogyakarta related to river restoration is reported in table as follow:

a. Interview Results: I. The Role of the City Government

No.	Question about policy	Answer
IA.1	Who has the idea of river restoration in Tongyeong	The central government; 2009 planned 20 river to be restored, 1 river is in Jeongrang river in Tongyeong
IA.2	What is the aims of the restoration policy	To support river ecosystem
IA.3	Wwho are responsible for financial support for river restoration	Central government : 67%, Province : 12 % and City T; 28 %
IA.4	When was the river restoration began and when is it finished	2009 the policy was signed 2011-2017 the planning and construction were done

		2017-2022 is the monitoring and evaluation
IA.5	How is the evaluation results of the restoration related to the goals?	Will be discuss with the environment office

No.	Question about collaboration	Answer
IB.1	Do the City Tongyeong has collaboration with other city in river restoration such a consortium, expert on river restoration	20 restoration rivers are national project therefore need collaboration with many stakeholders and experts.
IB.2	Do the City Tongyeong has collaboration with private sectors for river restoration	Yes , but not really develop.
IB.2	Do the City Tongyeong has collaboration with river community	Yes,
IB.4	Do the City Tongyeong has collaboration with University or experts for river restoration	

No.	Question about collaboration	Answer
IC.1	How do the City Tongyeong start the restoration	Start with public consultation invited society, expert and city government. At the beginning the public did not understand. After construction they now and agree to the project.
IC.2	Who planned the river restoration and how much the budget	The City Tongyeong office of river restoration River Jeongrang 1,8 km

		<p>Bevor is box culvert –has to be opened</p> <p>Buy the land: 16.000.000 USD</p> <p>Construction: 10.000.000 USD</p> <p>Total project: 26.000.000 USD</p>
IC.2	How was the planning, computer simulation program or physical modeling in laboratory?	<p>FS, Planning, DED, Computer simulation.</p> <p>Since not enough water, the project builds a dam (volume 28.000.000 m³ ?) to restore water in the dry season with pumping station.</p> <p>Construct wetland to restore water and treatment the water</p> <p>Open the conduit and change into natural river with stones revetment.</p> <p>Plant grass, herbs, threes act.</p> <p>About 800 m long of the river is not restored jet, because it is located in the middle of residents. It could be very expensive for land acquisition.</p> <p>This river restoration construction was planned with 80 year flood period.</p> <p>Note: For big river with 200 years flood period, and middle river with 100 years flood period, and small river with 80 years period. It can be change in the future because of climate change</p>
IC.4	How was the construction stepwise	Survey, planning, computer simulation,

		Detail Engineering Design, and construction.
LC.1	How was development after construction	20.000 craps/year were released by community to clean up the rest of the garbage Some aquatic plant 10.000 plants/year were planted by community

b. Interview result: II. The Role of the River Community

Name of the community : Conservation of nature,

Slogan : Deveation from nature is deviation from heppyness

No.	A. Question about understanding of people or community about river and river restoration	Answer
II.A.1	Can you tell me what the function of the river is?	They fill, that the drought of the river getting worsher. This year is the droughtes since 1992.
II.A.2	Can you tell me how important is the river?	River is very important, it must be taken care. River is the best frien and our neighborhood. If we do not care to the rivers, so meny problem will hapen (mosquito, colera act.)
II.A.2	Can you tell me, how was the condition of the river for 15 years ago..?	The river was derty full of garbish and trash. And some rivers are covered by concrete or changed to conduit or box culvert.
II.A.4	What did you feel when the river was damage or full of garbage and polluted?	I fill not gut
II.A.5	Please explain me what is the river restoration?	To make river clean and green as well as more fishes like natural river.

No.	B. Question about activity and participation of the people and community	Answer
II.B.1	Who had ide to restore the river?	Government
II.B.2	Do you organized the river community or the government or NGO set up your river community?	Fistly the goverment create the community 1971.
II.B.2	Is your community organization has legal papers?	Yes
II.B.4	How many times a week your community has meeting?	Officially one time/month and normally 2-3 times/month
II.B.5	Do your community has fix program for river? Or you just spontaneously make activities?	<p>One time per month and spontaneously Activity depending on the problem.</p> <p>Monthly program:</p> <p>Dec-Feb: internal meeting (for example in Januari 2018 discussion about year program, discuss about issues and what kind of problem really hapend act.)</p> <p>Funding from Province and City goverment for buy the material (crabs and <i>acorus colomus</i> (sweet flag), room for meeting.</p> <p>March to April : planting <i>sweet flag</i> near river</p> <p>Mei-Jun – release crabs (chinese mitten crab or <i>eirochier sinensis</i>)</p> <p>July- August : picking garbis in river (in this</p>

		<p>season many tourist come to tongyeong with garbis)</p> <p>Sept-October : Province community competition in September and October the competition in national level</p> <p>Nov: checking and evaluation about the condition of the river.</p> <p>Fix program and every year big meeting in national level and 2 time in province level</p>
II.B.6	Do you work in the community as volunteer or based one salary?	volunteer
II.B.7	Do you care about upstream and downstream condition of the river?	<p>The river in Tongyeong is very short, so there is no boundary. The condition in upstream is no problem. Tongyeong city is ocean city so the pollution might influence to oceans.</p> <p>The name of the community is nature protection community in Tongyeong.</p> <p>They focus on the downstream area, where the connection river and ocean are here</p>
II.B.8	What do you do for the other river?	<p>They work together with the villgae office to care the river and nature, and even also work for disaster with village people.</p> <p>They work together with other community in tongyang and also share with other nature protection community</p>

ILB.9	What is your activity every day or week related to river?	Every day is just keep watching the river One a month we do cleaning up river from trash and garbish.
ILB.10	How long have you been active as river community member?	Since 1992 he started to joint the community The communities in Korea was build in 1971
ILB.11	How many person are active in the river community?	In Tongyeong there are 40 persons, In Korea the river community member is 50.000 persons
ILB.12	Do yo have difficulties in organize people in the river community	The member of Tongyeong is more then 200 person now is only 40-50 person. Even decreasing the 40 members is really has motivation. The importan thing is the member willingness. The difficulty is the human management He cant force the member to join the activity. Now even the number only 40 person, it is very motivated person. Its better than just 200 but only less motivation.
	What do you plan for the sustainability your river community organization	Steadly work. Neture is changing, so they have to take care more 10 years. It is olny possible if we work steadily

C. Question about Collaboration and Network

No.	C. Question about	Answer
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	Collaboration and Network	
II.C.1	How do you maintain the contact among community member?	We have SNS (Naver Band) -Korean Application. It is like face book for 40-50 years old Korean People.
II.C.2	How many institution have already been working together with your community	Environment institution, University (students), school, viilage community
II.C.2	Do you know what is networking?	I know, just like making connection between river community member, sending fotos, information act.
II.C.4	Do you have networking among river community in Korea?	Yes we have and we are connected through SNS, it isv(Naver Band) -Korean Application a Hand Phone Appliction.
II.C.5	What do you use for communication with other community in Korea?	NMS-similar to face book
II.C.6	Do you know to set up networking among community member?	Not really
II.C.5	Do you want to set up networking among community?	Not so, it iss dependt on the activity. If the activity need more people the will contact othe institution. Eduction is very important (elemtery school, hifht school act). He recomen work together with the schoo.

C. The Interview Result of the Community Leaders in Yogyakarta

The similar questionare was send to Yogyakarta Indonesia and masterdegree student interviwed 3 community leaders in Code river Yogyakarta Indonesia. The interview result is still in Indonesia Language, it seems to be difficult to translate. Therefor the interview document is presented in indonesian language as follows.

A. Pertanyaan tentang pemahaman orang atau komunitas tentang sungai dan restorasi sungai.

No	Pertanyaan	Responden	Responden 2	Responden 3
1	Menurut anda apakah fungsi sungai itu?	<p>Bpk. Totok Pratopo Coomunity leader of river Code Jetisharjo</p> <p>Mengalirkan air hujan pd musim hujan, habitat bagi ikan, katak, burung. Sumber air bagi warga.</p>	<p>Bpk. Ari (Coomunity leader of river Code in Jembatan Gondolayu)</p> <p>Sungai adalah tempat mengalirnya air dari mata air dan hujan ke laut. Sehingga dari situlah hidup berbagai macam ekosistem</p>	<p>Bpk. Haris (Coomunity leader of river Code in Dewobroto)</p> <p>Sebagai wadah untuk aliran air dari hulu ke hilir. Intinya sebagai wadah berfungsi sebagai pengairan, wisata, heritage, pendidikan dll.</p>
2	Menurut anda seberapa penting sungai itu?	<p>Sungai , dlm kontek Sungai Code sangat penting, karena : persis membelah kota Yk , strategis sbg RTH Publik, suplay oksigen dan ruang rekreasi murah</p>	<p>Sangat penting, karena bisa menjadi salah satu sumber penghidupan manusia</p>	<p>Sangat penting karena sungai ibunya peradaban. Kota-kota bersejarah kebanyakan mempunyai sungai besar (Nil, Musi, Brantas, Bengwawan Solo)</p> <p>Sungai juga sebagai sumber kehidupan</p>

3	<p>Bagaimana kondisi sungai selama 10 tahun yang lalu ...?</p>	<p>Kondisi 10 tahun lalu..., kami bergerak sejak 2001, pada saat pembangunan talud masif, dg menghabisi rumpun rumpun bambu. Sempadan menjadi penuh sampah warga kampung. Pohon perindang habis, sungai menjadi sangat panas.</p>	<p>Manusia lepas dari kendali pentingnya sungai. Sehingga secara tidak sadar menjadi perusak baik airnya, sempadan maupun ekosistemnya</p>	<p>Rusak berat, sangat memprihatinkan. 80% rusak. Limbah cair, limbah padat dan limbah industry masuk ke sungai mencemari ekosistem, sempadan rusak, talud tidak ramah lingkungan, ikan tidak bisa berkembang biak dengan baik di sungai. Masyarakat membuat rumah di sempadan sungai.</p>
4	<p>Apa yang anda rasakan ketika sungai rusak atau penuh dengan sampah dan tercemar?</p>	<p>Sungai sdh bukan lagi wilayah yg nyaman, sehat dan menyenangkan. Udara sekitar sungai panas, dan bau tak sedap. Juga banjir rutin tahunan</p>	<p>Banjir dan menjadi salah satu sarang penyakit serta tidak bisa menikmati keindahan air sungai</p>	<p>-Berdampak buruk bagi kesehatan -Baku mutu jelek, bila dikonsumsi membahayakan, Ecoli tinggi -Menimbulkan bau yang tidak</p>

					sedap, timbul penyakit kulit
5	Menurut	Restorasi adalah	Mengembalikan	Mengembalikan	
No	Pertanyaan	Responden 1	Responden 2	Responden 3	
1	Siapa yang punya ide untuk melakukan restorasi sungai?	lingkungan. Dan pada th 2000, muncul sporadis kelompok kelompok masyarakat	fungsi sungai dan bentuk sungai sesuai fungsinya, baik air bersama komunitas dan akademika sempadannya. di Code	dulu, menjadi lebih hijau kembali ke natural air menjadi layak konsumsi	Ide Pak Haris untuk di sungai Code sekitar tahun 2000. Dimana
6	Mengapa kalian melakukan restorasi sungai dan apa manfaatnya?	Agar kampung menjadi nyaman, dan potensi keanekaragaman sungai pulih, utk bisa dinikmati warga.	Kami melakukannya agar sungai dapat kembali berfungsi sesuai dengan fungsinya. Sehingga berguna bagi kehidupan manusia dan tidak mendatangkan bencana	Panggilan hati, karena mencintai lingkungan.	

A. Pertanyaan tentang kegiatan dan partisipasi masyarakat dan komunitas

		yg peduli dg sungai. Bersih sampah, menanam, berkesenian dll		membentuk komunitas gerakan cinta Code. Bahkan pernah dibelaang orang gila karena membersihkan sungai sendirian.
2	Apakah anda yang mengatur komunitas sungai atau pemerintah atau LSM dalam pembentukan komunitas sungai anda?	Ya kami warga pinggir kali, yg kemudian berjejaring dg perguruan tinggi dan pemerintah.	Kami dan masyarakat	Iya, sebagai penggagas, pendiri dan penguku
3	Apakah komunitas sungai anda memiliki dokumen yang diakui secara hukum?	Ada badan hukum yg sah sebagai perkumpulan (Kemenkumham)	Ya	Untuk gerakan cinta code tidak ada. Untuk Pemerti Kali Code ada.
4	Berapa kali seminggu anda melakukan pertemuan dengan komunitas Anda?	Sangat fleksibel. bisa tiap hari ketika ada event . atau jelang ada tamu	Tentatif	-saat awal-awal sering sekali hampir tiap hari -sekarang biasanya 1 minggu sekali
5	Apakah komunitas anda memiliki program yang pasti untuk sungai? Atau	Ada yg jadi program unggulan	Secara spontan tapi punya tujuan yang pasti yaitu penataan	Ada, memiliki program yang

	Anda hanya secara spontan?		sungai yang lebih baik	pasti
6	Apakah anda bekerja di komunitas secara sukarela atau digaji?	Sukarela , tetapi mulai mengembangkan bisnis pariwisata dan pendidikan	Sukarela	Sukarela, bahkan uang pribadi keluar. Karena panggilan hati
7	Apakah anda juga memperhatikan kondisi hulu dan hilir sungai?	Ya, selalu berkomunikasi dg Sleman dan Bantul	Belum sepenuhnya (Belum maksimal)	Ya, karena merupakan satu kesatuan
8	Apa yang anda lakukan terhadap sungai-sungai lainnya?	Berjejaring, sharing	Baru sebatas menjadi studi banding kami baik yang sudah berhasil maupun yang belum	Sebagai ketua asosiasi sungai saya menggerakkan dan membimbing komunitas sungai lainnya supaya bergerak seperti Sungai Code
9	Apa aktivitas yang anda lakukan setiap hari / minggu terkait tentang sungai?	Memelihara taman, bersih sungai, pengawasan air bersih, penawaran wisata, penerimaan tamu	Masih sebatas membersihkan sampah dan sosialisasi	-Edukasi dan Sosialisasi : manfaat sungai, kebersihan sungai, ekosistem sungai

				-Ekonomi: membuat susur sungai, tubing, kawasan kuliner
10	Apakah anda yang mengatur komunitas sungai atau pemerintah atau LSM dalam pembentukan komunitas sungai anda?	Ya, sejak Tahun 2001	Ya, kira kira 11 tahun.	Ya, secara formal dari tahun 2000 melalui gerakan cinta code. Secara informal dari SMA tahun 1980 an

B. Pertanyaan Tentang Network dan Kolaborasi

No	Pertanyaan	Responden 1	Responden 2	Responden 3
1	Bagaimana anda mempertahankan anggota komunitas?	Konsolidasi, berbagi, berkegiatan bersama, berorientasi pada kesejahteraan sesama pegiat.	Selalu berkomunikasi dan pelibatan dalam kegiatan	Gerakan Cinta Code: Menghargai, mengalah dan tidak kaku. Intinya kebersamaan karena belum resmi. Pemerti Kali Code : Berbagi bagi tugas karena sudah merupakan lembaga resmi.
2	Berapa banyak institusi yang telah bekerja sama dengan komunitas Anda?	Perguruan tinggi (4), agent tour travel, Lembaga Pendidikan, Pemerintah, swasta perbankan	Beberapa perguruan tinggi dan perusahaan	Banyak. Perguruan tinggi, pemerintah, swasta, komunitas lain
3	Apakah anda tahu apa	Membangun	Ya, jaringan	Tau, sudah

	itu networking?	jejaring ...mutualisme	kerjasama	dilakukan dari awal terjun supaya mendapatkan dukungan dengan berbagai aktivitas dan kegiatan.
4	Apakah anda memiliki networking dengan komunitas sungai di Indonesia?	Ya melalui grup WA, dan saling kunjung karena fasikitasi pemerintah	Ya, dengan beberapa komunitas sungai lain	Ya, dengan wa grup restorasi sungai pusat, daerah dan lain sebagainya.
5	Apa yang anda gunakan untuk komunikasi dengan komunitas lain di Indonesia?	Dg WA grup, dan saling kunjung, juga FB	Melalui medsos dan pertemuan dan atau kegiatan bersama	
6	Apakah anda tahu cara mengatur networking untuk anggota komunitas?	belum jelas benar	Secara teori tidak terlalu memahami	
7	Apakah anda ingin menginisiasi networking dengan komunitas lainnya?	Belum	Siap	

C. Pertanyaan tentang pengetahuan sungai

No	Pertanyaan	Responden 1	Responden 2	Responden 3
1	Bisakah Anda menjelaskan apa itu ekosistem sungai?	Saling berhubungan antara unsur abiotik sungai dg unsur biotik (flora fauna) sungai.	Semua kehidupan di sungai	Bisa, keterpaduan biota. Lingkungan sungai asri, airnya jernih.
2	Dapatkah Anda menjelaskan tentang keterkaitan populasi ikan dengan pencemaran air sungai?	Dlm air yg terpolusi ikan tdk bisa berkembang biak secara optimal.	Secara garis besar keberadaan ikan tertentu misal ikan sapu-sapu identic dengan polusi air	Sekarang habis, padahal dulu banyak. Dulu ada waader, mujair, nila, tambro, sepat, lele, belut. Sekarang hanya ada sapu-sapu, cetul dan lele.
3	Bisakah Anda menjelaskan mengapa banjir terkadang datang?	Banjir datang, krn trend nya, semakin berkurang lahan utk meresapnya	Secara garis besar dalah luapan air hujan keluar dari sungai karena	Karena sungai sudah tidak muat karena penyempitan, sedimen dan

		<p>air hujan.</p> <p>Seluruh drainase perkotaan masuk ke sungai.</p> <p>Penampang sungai makin sempit krn hilangnya sempadan.</p>	<p>sungai tidak bisa menampung. Hal ini terjadi karena ulah manusia maupun karena alamiah</p>	<p>banyak sampah/limbah.</p>
4	<p>Mengapa terjadi kekeringan sungai?</p>	<p>Tanah sdh tdk banyak menyimpan air</p>	<p>Kekeringan sungai dapat disebabkan kearau yang panjang. Tetapi dapat pula karena kurangnya tanaman penyimpan air di hulu akibat penggundulan. Tetapi juga karena betonisasi. Sehingga air hujan langsung terbuang tanpa terserap tanah</p>	<p>-Kemarau panjang</p> <p>-Pohon ditebang dan sungai di beton yang mengakibatkan mata air mati</p>

5	Apa perbedaan antara sungai alami dan sungai buatan manusia menggunakan beton?	Sungai alami sehat..., sungai beton tdk sehat dan terus akan terdegradasi	<p>Sungai Alami :</p> <ul style="list-style-type: none"> -Ekosistem cenderung lebih nyaman -Arus air terjadi secara alami <p>Sungai Beton :</p> <ul style="list-style-type: none"> -Ekosistem terutama ikan akan semakin berkurang -Arus deras dengan libasan kencang -Pertumbuhan ekosistem bisa berubah bentuk dan jenisnya -Kemungkinan banjir lebih berbahaya 	<p>Sungai Alami :</p> <ul style="list-style-type: none"> -Kehidupan biota terjamin, ramah lingkungan, banyak pohon, banyak ikan, banyak burung. <p>Sungai Beton :</p> <ul style="list-style-type: none"> -Panas, biota mati, ekosistem rusak. Pohon-pohon tidak ada.
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D. Pertanyaan tentang Eco-Engineering

No	Pertanyaan	Responden 1	Responden 2	Responden 3
1	Apakah anda tahu mengapa dalam restorasi sungai menggunakan eco engineering?	Kurang paham	Karena penataan dengan pendekatan ekologi akan lebih alamiah	Tidak tahu, yang penting bisa kembali alami.
2	Bisakah anda menjelaskan beberapa teknologi untuk melindungi erosi tebing?	Secara vegetatif dan tanaman , bambu dan jenis tanaman lain yg sesuai.	Dengan terasering dan dibuat tanaman keras sehingga tercipta sabuk hijau	-Tidak buat bangunan di tebing -Tidak tebang pohon di sungai
3	Bisakah jumlah populasi flora dan fauna yang meningkat setelah dilakukan restorasi?	Bisa.	Bisa, karena mereka lebih banyak tempat untuk berkembang biak	Bisa sekali, dengan restorasi sungai lingkungan kembali ke awl dan merupakan jalan terbaik
4	Dapatkah anda menjelaskan teknologi eco engineering terbaik yang bisa meningkatkan populasi fauna (ikan) di sungai?	Kurang paham	Mengembalikan sempadan dengan tanah dan tumbuhan (bukan beton) serta mengembalikan batu-batu kali sebagai tempat berkembang biak ikan	-fishway -ritual memanggil ikan secara simbolik dengan membersihkan batu-batu dari sampah

Result of the interview

1. The river communities in Yogyakarta were established by them self in the year of 2000. The Tongyeong natur conservation community is established since 1971 by the goverment.
2. Among river communities in Yogyakarta have their own network organization and has no structural connection with the goverment. The Tongyeong natur conservation community has structural orginizing relationshif with other communities.
3. Both community leaders in Tongyeong and Yogyakarta have enough knowledge about river, collaboration, network and communication with other communities.
4. The year program of the Tongyeong natur conservation community is already fixed every year, while the year programs of river communities in Yogyakarta are not defined regularly, some program is fix program but in general it depends on the external situation.
5. The motivation of both community to keep river clean and healthy is high
6. There are some similar programs supported by goverment related to river restoration annually for example river community national meeting, river community national and provincial competition act.

5.7 Presentation in the RCE Tongyeong Convergence

To support the Annual RCE Tongyeong Conference on ESD, a set of presentation about Indonesian River Restoration Movement is developed and prensented. Some slides of the presentation are bellow and the full presentation can be seen in the attachement.



Greeting from RCE UGM



Background and Problems of River Restoration Movement

National Issues, Resilience on:



River is Crosscutting Issue



River is Crosscutting Issue



But, what happen with the Indonesian rivers at the last 25 years ?

People treat rivers as a waste disposal (2004-2010)



The rivers cry for help, we have to help them.

We have to restore the rivers,.. now

What are to be restored..?

1. Water-Hydrology (quality & quantity)
2. Ecology (quality & quantity of flora, fauna, diversity)
3. Morphology (meandering, diversity)
4. Social, Economy and Culture
5. Regulation and Institution

What are the goals of river restoration..?

- To Reach River :
1. Clean
 2. Healthy
 3. Productive
 4. Safe
 5. Conserved
 6. Sustainable in Use (SDGs)

Goals

Restoration in River Code

Clean up pollution, recontouring, re-greening, support awareness, build institution/regulation



Restoration of Cheonggye-cheon Project in Seoul



River Restoration on Cheonggye-cheon



Restoration on Jeongrang River



5.8 Book Chapter

Parallel to the study a book chapter about river restoration was written. This book chapter will be collected with other chapters to be developed into a book with title River Restoration Movement in Indonesia. The restoration activity in Tongyeong will be discussed in this chapter. Unfortunately this book chapter is written in Indonesian language, but it can be translated in English or Korean language. A part of the book chapter is below:

Chapter II

The Development of River River Restoration

2.1 Perkembangan Restorasi Sungai di Dunia

Sejarah restorasi sungai dimulai di dunia Eropa dan Amerika seperti diantaranya sungai Rhain, sungai Danube, sungai Misisipi dll. (Maryono, 2006). Di Eropa terjadi pembangunan sungai secara besar-besaran pada abad 18 sampai 19, dimana sungai direkayasa menjadi alur transportasi darat utama, sumber penghasil energi hidro dan sumber air pertanian serta menjadi saluran drainase dan sanitasi. Pada dekade pembangunan sungai ini menghasilkan perubahan morfologi, ekologi dan hidrologi sungai secara besar-besaran. Sebagian besar sungai dibuat tanggul dan talud memanjang, meander sungai dipotong (short cut), sempadan sungai dihabiskan untuk pemukiman, perluasan kota, fasilitas umum, fasilitas ekonomi dan boleh dimiliki oleh industri dan perorangan. Sungai menjadi tempat pembuangan sampah dan limbah industri dan domestik yang legal. Sungai yang kurang dalam dikeruk, yang terlalu dalam diurug, yang terlalu lebar di persempit, yang dinamis alirannya distabilkan dengan pengarah arus. Sepanjang sungai dibangun pembangkit listrik tenaga air (hidro power) besar-besaran dari hulu upstream hingga middle stream bahkan hingga sampai di downstream. Sungai-sungai menjadi relatif lurus-lurus, danau2 pinggir sungai termasuk *Oxbow* diurug dijadikan lahan pemukiman atau fasilitas umum. Sungai-sungai kecil juga dilakukan “pembangunan” dengan pembetonan dinding, pemasangan site pile, mengalihkan alirannya, menutup dengan gorong-gorong, atau bahkan banyak yang

dimatikan atau disatukan dengan sungai lainnya. *River Engineering* berkebang pesat, namun perkembangannya sangat partial, yaitu hanya menyelesaikan masalah lokal dan sektoral. Pemahaman keterkaitan hulu dan hilir belum berkembang, keterkaitan antara pelurusan dan pembedaan tebing sungai terhadap banjir di hilir dan kerusakan ekologi belum dipahami. Pengaruh sampah dan limbah terhadap banjir dan kerusakan air tanah serta kerusakan ekosistem sungai belum menjadi pertimbangan penting.

Periode pembangunan sungai ini pada dekade berikutnya yaitu abad 20 menuai dampak yang luar biasa. Dampak tersebut berupa banjir di hilir makin intensif, penurunan muka air tanah makin intensif, ekosistem sungai rusak dan mati, sempadan sungai sudah menjadi pemukiman, kualitas air sungai sangat buruk, dan lain sebagainya.

Berdasarkan adanya dampak negative yang luar biasa tersebut dan juga berkembangnya wawasan ilmu interdisipliner, maka mulailah para ahli memahami kesalahan abad lalu yaitu melakukan “pembangunan” sungai secara sektoral, lokal dan temporal, sehingga dampaknya sangat besar. Maka muncullah konsep *River Restoration* (Restorasi Sungai) atau *River Renaturalization* (Renaturalisasi Sungai). Arti restorasi sungai adalah upaya memulihkan kembali sungai yang telah terdegradasi. Sedangkan Renaturalisasi sungai adalah upaya untuk mengembalikan sungai ke kondisi alamiahnya semula. Kedua istilah ini dalam dunia akademik sering dipakai dan substansinya hampir sama (lihat Maryono 2006 Restorasi Sungai, Pembangunan Sungai, dampak dan Restorasi Sungai).

a. Restorasi sungai di Indonesia

Beberapa penggal sungai di Indonesia sudah dilakukan restorasi antara lain sungai Cikapundung, Bandung Jawa Barat dan sungai Gajah Wong di DIY. Berikut gambar restorasi sungai tersebut.



Restorasi sungai Cikapundung (oleh Kota Bandung dan BBWS Citarum), berhasil menjadi edukasi cinta sungai dan sekaligus sungai bebas sampah



Restorasi sungai Belik (oleh UGM dan BBWS SO), Kali belik menjadi tempat rekreasi, studi lingkungan sekaligus retarding basin yang mencegah banjir di hilir. Sumber:

b. Restorasi sungai di Korea

Restorasi sungai di Korea dan telah banyak dikukan sebagai contoh restorasi sungai di Cheonggyecheon dan Sungai Batch di Jepang seperti pada gambar berikut ini.



Restorasi sungai Cheonggyecheon, Korea (sumber: blocktolkwithejay.blockspot.com)

Di Korea diawali tahun 2009 saat pemerintah menetapkan restorasi pada 20 sungai sekaligus dengan lokasi tersebar di seluruh wilayah Korea. Selanjutnya setelah dijalankan hingga tahun 2005, maka restorasi sungai dilanjutkan dengan setiap kota atau provinsi membuat kurang lebih 5 buah proyek restorasi sungai. Proyek restorasi ini benar-benar merubah sungai-sungai yang dulunya dibenton dan dijadikan gorong-gorong, direstorasi mejadi sungai yang separuh alamian sampai alamiah total. Restorasi yang dilakukan adalah adaptive, tergantung situasi dan kondisinya memungkinkan atau tidak. Contoh Restorasi sungai kecil di tingkat kota adalah restorasi sungai Chongyeong di Kota Tongyeong sebagai berikut ini,



Gambar : Restorasi sungai Chongyeong di Tongyeong Korea

6. Closing Remark

The 1 month study/research in RCE Tongyeong has resulted some products e.i result of research or study about river restoration in general, community development and eco- engineering and the comparative study between river restoration in Yogyakarta, Indonesia and in Tongyeong, Korea. Furthermore presentation material of river restoration in Yogyakarta and Tongyeong as well as the presentation material of Indonesian river restoration movement were developed and finally a book chapter about the development of river restoration has written. This research results need to be continued in order to have more information in detail for developing papers and lesson learn manuscripts.

I personally do many thank to the RCE-Tongyeong for inviting me to do comperative reseach on river restoration in Tongyeong and in Yogyakarta. I hope the collaboration between RCE Tongyeong and RCE UGM Yogyakarta can be developed intensively in the future.

Attachements:

1. Power Point Presentation of River Restoration in Universty of Gadjah Mada, Yogyakarta
2. Power Point Presentation of River Restoration in Jeongrang river in Tongyeong
3. Power Point Presentation of River Restoration in Sejahtera Park, in Tongyeong
4. Power Point Presentation of River Restoration Movement in Indonesia
5. Book Chapter of Development of River Restoration