

# URBAN HOUSING AND SETTLEMENT DEVELOPMENT BASED ON SUSTAINABLE WATER MANAGEMENT<sup>1</sup>

(Case Study: Housing and Settlement in Cikapundung Riparian, Bandung:  
A Preliminary Study)

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## ABSTRACT

This article was derived from a research related with the urban settlement development based on the water usage management, it was conducted in 2009. Some settlements in the Cikapundung Riparian were selected as the research areas. The quantitative and qualitative approaches were used to collect and analysis data.

Nowadays, Bandung in an extreme condition: lack of clean water resources in dry season, and flooded in rainy season. Uncontrolled growth of housing in Cikapundung Riparian areas were assumed giving significant contribution to increase the water run off.

The inhabitants of some rural settlement in the upper stream could always have the water needed freely and wastefully, even in dry season. They used spring and ground water as their water resources. There was some communities based on water management in some informal and formal settlements in the upper stream and the flat-lower stream. The Water City Management (PDAM) was not able to provide water in the dry seasons. In this time the inhabitants would use all the way to get water for daily.

Rivers were treated as waste disposals for activities: domestics, agriculture and industry, even the PDAM used rivers for their resources. There were communities based on waste managements in several settlements. In fact there were some concepts to keep water sustainable, it was already implemented but partially. The water wastefully behavior and lifestyle still do. Community based development for zero sum run-off settlement planning and designing would only succeed to keep the sustainability of urban water if it conducted comprehensively in the contexts of wider sustainable urban development framework. It would need good collaboration of all stakeholders continuously. All of actors need to be empowered, and the development institution needs to be changed.

Keywords : water usage management based on community, urban housing and settlement, Cikapundung River Riparian.

## ABSTRAK

*Paper ini ditulis dari penelitian yang berhubungan dengan pembangunan permukiman urban yang berbasis pada manajemen penggunaan air yang dilaksanakan pada tahun 2009. Beberapa permukiman urban di sepanjang Riparian Cikapundung menjadi area yang dipilih. Sedangkan metode yang digunakan adalah pendekatan kuantitatif dan kualitatif untuk mengumpulkan dan menganalisis data.*

*Pada saat ini, Bandung dalam kondisi cuaca yang ekstrim, kekeringan dan kesulitan air bersih terjadi saat kemarau sedangkan banjir melanda saat musim hujan tiba. Pertumbuhan permukiman yang tidak terkontrol di wilayah Riparian Cikapundung diduga memberikan kontribusi signifikan atas peningkatan limpasan air hujan yang terjadi. Kebiasaan masyarakat permukiman di daerah aliran Sungai Cikapundung selalu menggunakan air secara boros saat musim hujan dimana air cukup tersedia, sedangkan pada musim kemarau terjadi kekeringan. Masyarakat sebagian besar menggunakan airtanah (mata air/air sumur) sebagai sumber air yang utama. Beberapa komunitas bahkan membentuk manajemen penggunaan air secara informal seperti di daerah hulu sungai. Permukiman formal umumnya menggunakan air yang berasal dari PDAM meskipun kinerjanya tidak optimal dalam pelayanan saat musim kemarau.*

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*Sungai Cikapundung diperlakukan sebagai tempat buangan limbah domestik, pertanian dan industri meskipun dari sungai ini PDAM menjadikannya sebagai bahan baku air untuk diolah. Kondisi ini telah mendorong beberapa komunitas menerapkan manajemen persampahan di lingkungan tempat tinggalnya, menerapkan konsep untuk menjaga air tetap ada secara berkelanjutan. Sayangnya dalam praktek hal ini dilakukan secara parsial. Penggunaan air secara boros menjadi gaya hidup yang umumnya ditemui di masyarakat. Jika manajemen penggunaan air didesain dan dalam perencanaan yang terintegrasi dalam suatu kerangka perencanaan pembangunan urban, maka hal tersebut memerlukan kerjasama semua stakeholder pemangku kepentingan dan kebijakan untuk duduk bersama membuat perubahan dan memberdayakan semua pihak dalam manajemen air untuk perkotaan.*

*Kata-kata kunci : Manajemen penggunaan air berbasis komunitas, perumahan dan permukiman urban, Riparian Cikapundung.*

## **I. Introduction**

This is research related with the urban settlement development based on the sustainable water provision and usage. It was conducted in 3 years and its from first year of research. This article derived from result of preliminary study in first year – Urban Settlement Revitalization : New Patterns in Urban Settlement Development based on Sustainable Water Usage. It was part of Program Hibah Kompetitif Penelitian sesuai Prioritas Nasional, Batch 1, and funded by National Education Ministry, in 2009. The leader is Dr. Ismet Belgawan Harun, and then replaced by Dr. Indra Budiman Syamwil.

The first year of research is baseline survey. Areas study was settlement in Cikapundung River Riparian. Refer to Puradimaja's Research in 2006 (in Affif, 2009) based on geographic and Cikapundung River stream, the location from upper stream in Bukittinggul to downstream in Citarum River. Study areas divided in 3 zones, were upperstream-hillside zone, hillside-flat lower stream zone, flat lower stream-downstream zone. Each zone was researched by grouping ; formal settlement (housing) and informal settlement (*kampoong*).

This baseline survey was conducted by interview and observation method on location. Interviewing with key person who involved in water usage management in communities and some responden filled questionnaire. Baseline survey conducted on 14 days in November 2009. Pre-research is done by observation to find locations in study area before.

## **II. Cikapundung Riparian**

Cikapundung Riparian is around Cikapundung River areas, it is important part of watercycle in Bandung Basin. In recent years, most of some areas in Cikapundung riparian has changed became settlements. The areas was built and covered. The

effect were water run off accumulated more and water isn't absorbed by land (Affif et al. 2009)

Water run off flow to downstream of Cikapundung River and flow away to Citarum River. Change of land function became settlements in Cikapundung Riparian contributed flood in South Bandung. Early 2010, flood in South Bandung caused disadvantages in economic. In 10 days industries count productivity loss about 20 Billions rupiahs (Depkominfo, 2010).

Flood showed the condition that natural watercycle has disturbed in Bandung Basin. The extreme condition while dry season many area had lack of water supply and in rainy season water overflow and flood in many area. It caused quality of environment and effected to quality of life and settlement in Cikapundung Riparian decreased.

Suganda et all (2009) stated that quality of environment settlement indicators can be measured by aspects :

1. Liveable rooms (wide, wide per people ration, room's number)
2. Quality rooms (natural lighting and natural ventilation)
3. Open Space (wide yard, vegetation)
4. Water (water resources and public waste disposal facilities)
5. Waste and Garbage (disposal system dan urban drainage)

Settlement conditions in Cikapundung Riparian tend to negative indicators, refers to gopen space, water and waste disposal aspects. The plain in Cikapundung Riparian ideally for green and open space, but have changed and built as high density settlement. It verge the river, decrease open space and vegetation. The other aspects tend to negative indicators too, especially in high density *kampoong* cluster.

Negative indicators showed decrease level and volume of ground water. People did difficult way to

get water resources, the other hand Water City Management and Service (PDAM) unable provide water supply continuously in dry season. Cikapundung river became disposal of all waste and water run off, the pollutions increased. Two indicators refers that environment support for Cikapundung Riparian has decreased. It effect to quality of settlement decreased in this area.

Water supply problem caused productivity loss and people paid more to get clean water, water distribution and other facilities. This condition appeared in many area in Bandung not only in Cikapundung Riparian. Change of land function, space regulation developing, and decreased environment support became problems in urban scale (*Diskimrum, 2005*).

This will be an obstruction for Bandung development as metropolitan city. Bandung as metropolitan city prepared to support economic development for other city in West Java in 2015 (*Bappeda Jabar, 2005*). Bandung even prepared to have realibility infrastructure and settlement for Indonesia's creativity economic growth in 2025 and reach Millennium development Goals (MGDs) in urban settlement. It is big challenging and interesting for settlement design in *place-making* issue.

### III. Community-Based Water Usage Management in Cikapundung Riparian

Water problems emerged water management based on community model in settlement groups in Cikapundung Riparian. The purpose to get access to water resources and distribute for daily usage in their settlement. Water management based on community characteristic is involve participation people in every phase (*Masduqi, et all. 2008*). Actually, development based on community not only placed people as participant in development but also as subject ; inisiator, planner, designer, executor and manager of development.

In field survey, there were water supply based on community models in upper stream-hillside zone, it found in informal settlement group (kampong). In this zone, it is easy access to water resources (spring water) but need water infrastructure to distribute water to every household. Distribution technology was piping with gravitation method. It make water usage management cost lower.



Figure 1 : Water management based on community in upperstream-hillside zone. Cibodas Village Location. Source : (Bandung Map, 2009)

Infrastructure development for water supply is supported by NGO in technical and early costing. But in every phases from planning to construct phase involve people's participation. People as next costumer and manager of water management. In operational phase people create an organization for water management based on community in their settlement. In upperstream-hillside zone, there is rural settlement. Water not only need for daily usage but also for farming and breeding.

In hillside-flat zone, water management based on community model found in formal settlement group (housing), it was created by developer. There was easy access to water resources from gound water. Water disribution to every household use pumping and piping method, there is ground water tank for water supply in their settlement group.

In this zone, water usage is freely and tend wastfully water. People feel easy to get water supply and sufficient now, they forgot how difficult access to water sources before piping. Actually, they didn't get water sources free and should be efficient. Developer prepared water supply infrastructure and distribution facilities development in settlement from beginning.

Then water supply facilities was managed community. Community employed people to control the water management and paid operational costing. In this way, actually community participate as donatur. It refer formal and partial approach.

The other hand, water supply in formal settlement group inisiated by community (e.g ITB housing). In this case, water sources not only can be accessed by their formal settlement community but also by others community in informal settlement (kampong) around.

In flat-downstream zone, water management based on community found in informal settlement group. Water source pumped from ground water (artesis). Water source and infrastructure development funded by environmental revitalization programme as stimulus costing and by commercial building management as full of costing. Water distribution and operational facilities is paid by community. Then, people created water management based on communities in their settlement.

From beginning, environmental revitalization programme involved communities in each phases through planning, designing, executing, and operationing. Commercial building management asked representative people to make agreement built artesis well and pumping system, community can get water freely. Water distribution and operation became community responsibility. Community asked and paid some person to control water management in their settlement.



Figure 2 : Water management based on community in flat-downstream zone. Braga Kampong Location. Source : Bandung Map (2009)

Although communities in settlements have to do many effort to get water supply -include helped by others in costing and technology- but it didn't make them use water efficiency. It showed communities in Cikapundung Riparian have behaviour and life style tend to :

- In water supply availability ; tend unefficient and didn't care about others' needing
- In lack water supply ; tend to individualistic and competitive in effort to get water supply, didn't care if break the others' needing.

Individualistic behaviour emerged clearly in effort to get water supply from PDAM. Customers often pump water in pipe canal and harm other customer. The other hand, people in upstream zone treated

water source freely only for themselves not as public property.

#### IV. Sustainability Issue

Development based on community often treat as best development approach. In the way water supply, it is very important to examine in big scale ; city, urban and rural. Sustainable water supply concern to conservate water resources effort, keeping from pollution (e.g domestic waste disposal). Water management based on community did in several settlement grouping but only how to get accesed more easy than before. Waste management based on community did in several settlement grouping, but not succeeded. It caused by public servis facilities not good enough.

Result of survey showed that many thing didn't support for sustainable water supply. It refers to :

- Every settlements tend to contribute as pollutan for Cikapundung River
- Land covered tend to increase. Environment revitalization programme even caused it, e.g. narrow path covered by concrete an paving block and partial drainage revitalization.
- Commonly waste management system not good enough in communities, environment and city levels.
- Contradiction of understanding and behaviour in communities ;
  - People live near with river, but treat the river as waste disposal than water sources
  - People have good knowlegde for environment but haven't effort to support environment conservation in action.

The field survey showed that development based on community still not support to build a sustainable development collaboration among stakeholders; government, communities, public and private sector, and commercial sector. It not solve urban settlement problems integrated yet.

Water resources conservation is needed to support sustainable water usage for people. Private sector treated water as economic thing and profit oriented. Now, people often paid for mineral water drinking, rent land to get water sources, and get water source from commercial building management. It can be conflict causes someday.

Bai and Imura (2001) stated that 4 strategies in sustainable management of water resources concept

are demand management, supply management, efficiency enhancing and effluence management. Efficiency enhancing aim optimum use of resources, it consists 5 aspects; technology, economic instrument, law and regulation, public awareness and life style.

Water problem solving always use technology approach. Infrastructure and water supply facilities costing were caused but then emerged the water management problem of rehabilitation, maintenance and operational. The issue is community lost sense of belonging in sustainable water management phase.

The support to public awarness and lifestyle change is important to support water resources conservation. Environment, water usage and management, water supply facilities as common responsibility can be an approach to solve contradiction between understanding and behaviour. Lifestyle change will effect for water resources and settlement environment conservation.

## V. A Concept for Urban Settlement Design and Planning Based on he Sustainability of Water Resources

Water resources conservation efforts for settlements, commonly do in two ways, there are :

1. Rainwater resources use : rainwater became solution for water avalaibility needing. It can be developing concepts, e.g :
  - *Rainwater harvesting concept for water avalaibility in dry season.*  
Traditional rainwater water harvesting is practised by Indonesian in rural. Tandon or rainwater pond in every household used to keep rainwater for dry season. The pond can be use as fish keeping and other economic purposes. It can be found in rural settlement in Gunung Kidul, DIY.
  - *Rainwater keeping concepts in soil.*  
Traditional people modified embanking and ditch in their yard as ornament and avoid erosion. It can be water keeping and decreasing construction cost for drainage up to 50%.  
In high density settlement, it can be rainwater keeping in soil eventhough above covered through porified as infiltrated well. People still have water avalaibility in dry season in their wells. It practised in informal settlement in Pasirluyu, Bandung.
2. Water level resources keeping from pollutions concept. There are :
  - *Minimize waste volume disposal to water level* (river, pond, lake, etc) Maximize rainwater catching and infiltrating through open space area naturally or construction made. It

can be decreasing water run off volume through Cikapundung river water level. Tandon or rainwater pond planning and connecting well in urban scale will decreasing waste volume in urban drainage. Government make a plan to create Cikapundung reservoir in urban scale can receive water run off and water disposal from drainage in Bandung Basin.

- *Minimize pollutans to water level in river.* Practise 3R concept (recycle, reuse, replant) in waste disposal management. Waste flowing and processing in invidual or communal pond before it flow to river.

Actually, the efforts above often suggest to conserve water resources and environment in communities and settlements. Developers is like BSD did waste composting and practised waste cycle. But it still partial and based on projects, commonly did among stakeholders in specific and short time project.

Urban settlement based on water usage management concept need colaboration with government, private sector and communities to build capacity and increase environment support in urban scale. For e.g drainage and waste disposal no treat well if only do in community scale and new settlement partially.

Housing and urban settlement design and planning, e.g zero sum run-off concept, can conserve sustainable water resources and keeping water resources not only per community and partial settlement but also integrated in design and planing urban scale. But if unefficient behaviour and lifestyle still do, private sector just profit oriented, and government not pay attention in water regulation, there is difficult way to conserve water resources.

In urban development and urban water management, there were many stakeholder will involve ; individu, household, informal community, and birochracy organized. New urban settlement concept wil not based on physically '*blue print*' tend to be not succeed like before. The approach is developing physical model with equivalence principles, not only technology approach but also sustainable urban settlement developing approach. There will be need building development regulation and governance to support urban settlement development based on sustainable water usage management. The role of actors have to be rearrange with equivalence principles and cultural approach.

It is important to study building regulation phenomena. It will collect information and

intepretation from stakeholders through *Focus Group Discussion*. Then will be develop behaviour model in new pattern urban settlement based on sustainable water usage management. The team hope the research will continue in second year.

## VI. Conclusion

Water problems in Cikapundung riparian emerged water management based on community in settlement's groups. At least, there are 3 model of water management. But it didn't treat people to have public awarness to conservate water resources eventhough they know it very important to do.

Responsibility of water facilities maintenance very low. Keeping quality of environment not treated in action, people still do many thing that make pollution from their settlement, because irresponsibility inhabitants and lifestyle for environment.

Community Based Development or Community Based Planning and Design do not reach the goal if it not be part of planning and development approximation in urban scale. It is very to important to build empowerment, not just to communities but each development actors also. There's need positif collaboration in sustainable planning and keeping environment for quality life for next generation in future.

Especially, settlement design and planning have "sense of place" as important issue, because each settlement have differences in sosio-culture and ecologies. But every people and development actors have one goal for water resources management for better quality of life. It need collaboration from government, communities and private sectors to get innovation planning and development in creating sustainable settlement solution for better quality of life.

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## Endnotes

- [1] [www.kompas-online.com](http://www.kompas-online.com)
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