Reducing Aerial Environmental Burden

BANDUNG CITY-INDONESIA

By Ayu Sukenjah

Climate Change in Bandung

Climate Change has influenced the livelihood in Bandung. With over 2,4 Million peoples live in Bandung and the population still growth for over 0,46% a year, Environment and Nature Source Capacities was significantly pressing by populations mean and needs.

As the City with the highest populations density in West Java, Climate Change gives additional pressing and unique boundary to City Government to seek up solutions and managing the City Policies.

We know that solid waste problems, mass transportation, land-use issue are common problems to every growing and modern city but the effect of Climate Change make those common issues were not simply to solve as usual problems.

As example, Bandung Center aerial which designed and build in colonial era have been develop as area of free of flood and puddle even if a hundred year periodically rain has fall, but when the city infrastructure must face the climate change which cooperate with usual city problems the facts say that The City Must Change too or people will suffer and City will drown in unsolve misery.

City Growth and Its Impact

Bandung aerial were design in 1920 to accommodate 100.000 people and exceed to 2,4 million in 2014 and still on going growth, this condition cause major problems and impacts for people and government either to environmental capacities. Those Impact are :

- **Land Use Issue;**
- **High Density populations and dispread public facilities;**
- **Nature Source Crisis like fresh/under ground water supply;**
- **Lack of Green Open Space;**
- **etc.**

Aerial Environment Burden

To solve Climate Change Effects trough Mitigations and Adaptations Acts in growing and high density populations city are not implementing easily.

There are some Aerial Environment Burdens that been identified in Municipal Bandung which is :

a. Leak of Green Opening Space;
b. The amount of rain absorption area drastically incline;
c. Under ground water quantity reducing and Surface water level decreasing;
d. Temporary flood and puddles area spreading in high density community;
e. Water Crisis.

How to Reduce Aerial Environmental Burden

Government of Municipal Bandung, Environmental Communities Representative and Private Companies were sitting together sharing ideas and try to find some fast track breakthrough to solve the environment burden and climate change impacts and deliver some of this acts and massive movements that been expecting as the cure of our city problems.

There are :

1. A Million Biopori Rain Absorption Hole Movement;
2. Massive Development of Shallow well (targeted to 100.000 at year of 2019);
3. Increasing the pecentage of Open Green Space from less than 13% to 23% of Bandung Aerial at year of 2019;

The Acts

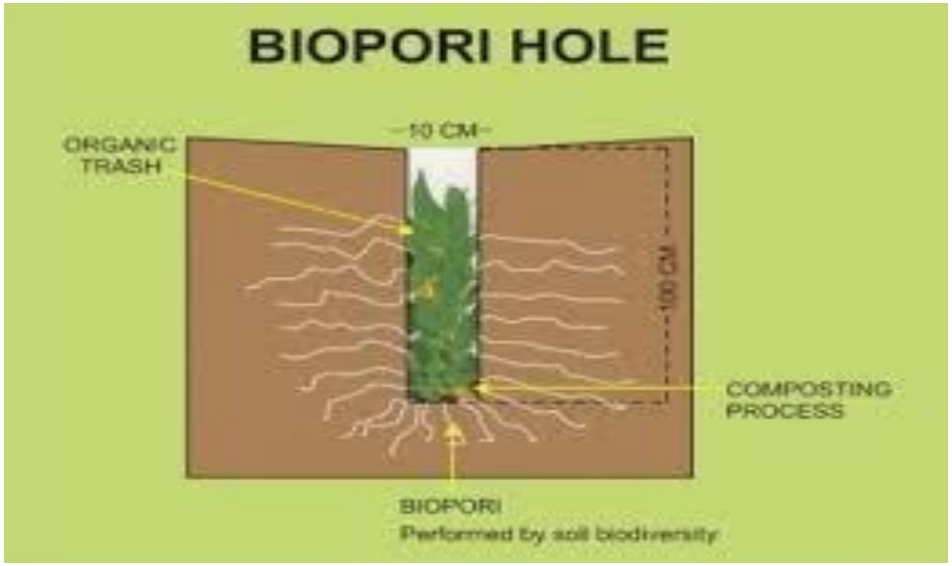
A. A Million Biopori Rain Absorption Hole (LRB) Movement

This Movement were initiated at the end 2013 by Major of Bandung City. The basic ideas are simple and cheap technologies can give a great effect when implemented massive and rapidly by all of city elements like students, government officer, private employ, and etc.

Million Biopori LRB were targeting one million LRB's Hole being deploy in a week (20 Dec 2013 to 25 Dec 2013) and had been succeed build **267.734** holes in 30 districts, 141 sub-district and being build by over 50.000 volunteers. This Movement continued as regular act and now near 400.000 LBR holes were deploy in every office, public place, residential, private company, military and police base and many more.

Biopori Rain Absorption Hole

This simple and cheap technologies being improved in Bogor by Mr. Kamir R Brata and adopted by massive movement by Citizen of Bandung City and right now being duplicate by more of 20 Major Cities in all over Indonesia.



Biopori Rain Absorption Hole

Biopori Rain Absorption Hole Technologies have several benefit and easy to implemented from early age student to senior citizen and had many benefit which can help to solve several city problems, reducing environmental burdens, and adaptation or both mitigation to climate change effects .

Biopori Rain Absorption Hole Technologies could utilized for :

a. Absorb rainfall from wide to narrow aerial where typical drainage system could not apply;

b. Reduce amount of puddle and temporary flood in relative short time because it can absorb puddle at least in size of 40 times from it diameter;

c. Increasing water sub-surface deposit which being use by 80% of city population as main fresh water source;

d. As first step of household solid waste reduction where about 20 % to 80% of organic waste could be proceed become compost in this hole;

e. Re-mediating biologic component in critical soil with lowest cost;

f. Preventing soil erosion and landslide;

g. As cheap composter unit which can handling about 3 to 6 liter of organic waste daily;

h. Reducing Carbon Emitting.

B. Massive Development of Infiltration Wells

Infiltration Well with 3 Typical of Use were massively develop in every district at Bandung in order to :

1. Reducing run-off and infiltrating rain water into sub surface deposit water line;
2. Recharging Aquifer;
3. Reducing flood and water puddle;
4. Preventing Land subsidence;
5. Water Deposit in dry season;

Bandung City have regulation about obligation to build one of these 3 type of well depending on building function and business type for every building permits applicant.

Infiltration Well

There are 3 types of Infiltration Well which deployed in Bandung as Regulation Mandatory :

a. Shallow Infiltration Well :

This type of well have dimension of 1 m x 12-36 m which use for infiltrating rain water from rain harvesting area and large water puddle to sub-surface water deposit line, pre treatment tank/unit must be imply to handling low risk contaminant before rain water infiltrated to well.

b. Deep Infiltration Well:

This Well utilize by underground water consumer as obligation for conservations aquifer and water resources where it dimension depending on the depth of tapping level from every permit holders.

c. Flood Infiltration Well:

This kind of Well are the cheapest type of well among those 3 type of well, with dimensions of 1 m x 1m x 2 m, this well build in narrow resident, public places and numerous sites all over Bandung Aerial as the preliminary flood controls infrastructure which can reduce the burden of drainage system.

There are about 420 Well Type A, 200 Well Type B and over 22.000 Well Type C were build in all districts in Municipal Bandung From 2002 to 2014 at least 8.774 Wells of 3 type of Well were build from mid 2013 to mid 2014.

C. Increasing Percentage of Open Green Spaces

Due to National Regulation about ideal and affectivity of Green Open Spaces, every city in Indonesia require about 30% of it aerial becoming Green Open Spaces (20% public & 10 % Private).

This condition rarely can achieved by main city where high density population exist and spreading in all over area.

Bandung City have less than 13% of green open space at 2013 and targeting 10% addition in 5 years through several programs which establish by city stakeholder.

The Program are :

a. Repairing and utilizing over 100 existing city parks and build a new thematic park every month;
b. Build mobile park which can be deploy temporary in any open area;
c. Utilize private sleep land as public green open space;
d. Initiate regulation about obligation to Hotels and Mall Operator to have Roof Garden, Vertical Garden and increase trees planting and provide green open space;
e. Initiate and socialize urban garden and farming movement in rural area;
f. Utilizing and remediate critical and erosion land by implemented LBR technology and optimilize trees planting in city street;
g. Regulating green building standardization to new and existing buildings and push land use efficiency to new investor which appellant to building permits.

Thematic Park

Thank You

"Great City Leads by Good Person, Lived by Happy Citizens, and Friendly to Natural Sources and it Environment" ..... **M. Ridwan Kamil (Major of Bandung City**)