Cigondewah used to be a peaceful rural village near Bandung, Indonesia. With the rapid expansion of Bandung City as well as thriving industry, especially textile industry, Cigondewah is involved in a major transformation into a pre-urban industrial community. In this process, due to inadequate investment in infrastructure and extensive growth of industry areas, living conditions in the village have gradually decayed since 1990s. Industrial pollution, squeezing living area, unwise use of water are some of the most exemplary delimas.

The expanding factories and emerging immigrant workers, which is the consequence of unstoppable trend of industrialization, make problems even worse. The task is to understand the problem from a “flow” point of view, and to come up with a spatial solution based on flow research in order to help Cigondewah become an integrated while livable part of the new urban area.

**BAMBOOTOPIA × Bandung**

- Individual Research
- Individual design project
- Type of project: Education
- Time: 2016, 09 (Master graduation project)
- Period: 2*16 weeks
- Location: Bandung, Indonesia
Textile making is one of the most pollutive industries in the world. In Cigondewah, violating industry expansion has already caused considerable impact on people's life. Surface water system is directly influenced, so that people no longer use river water for daily use or recreation, however, they still irrigate food crops with polluted water, which might lead to food safety crises in much bigger range.

Almost all water use in Cigondewah, including those for industrial purposes, rely on ground water. Overextracting groundwater will cause severe geological disaster in the future.

Apart from water crisis, which is quite strange for such a wet region, violate industrialization keeps biting up precious green space in the village.

Over the past 13 years, two thirds of all green space, most of which is rice field are replaced by big factory plants or high-density housing for workers. Part of leftover fields are already purchased by textile factory owners, which means further invasion of the factory.
I came up with an industry system based on bamboo plantation. Bamboo fiber, a high-performance natural fiber for textile. Bamboo charcoal, a biobased water purification material. Bamboo leaf, biogas, clean, cheap, and renewable energy source.

**BAMBOO BASED INDUSTRIES**

I pictured a future in which bamboo is planted on the fields instead of rice. Bamboo is a common source of biomass in tropical regions. Once taken appropriate care, a bamboo plantation can keep producing steady amount of biomass (culms, leaves, and shoots) every year for 30-50 years without intensive maintenance like rice fields. Labors will be set free from rural work.

Processing bamboo into fiber will observably increase the profitability of the fields. In worst year, profit made from bamboo fiber is three times as much as that of best year’s rice production. However, bamboo as raw material makes little profit.

Given the size of the field, bamboo harvested, if arranged wisely, is able to be processed on site without occupying too much space.

Based on flow calculation, this industrial system, once properly run, can sustain itself without much energy or material input. Energy produced from fallen bamboo leaves can fully feed the demand of charcoal and fiber making process. With the help of biologic purification agency, water can be easily reused.

**TEXTILE FACTORY**

- Bamboo fiber
- High-performance natural fiber for textile
- Bamboo charcoal
- Biobased water purification material
- Bamboo leaf
- Biogas

**PROFITABILITY**

Processing bamboo into fiber will observably increase the profitability of the fields. In worst year, profit made from bamboo fiber is three times as much as that of best year’s rice production. However, bamboo as raw material makes little profit.

**SELF-SUSTAINED**

Based on flow calculation, this industrial system, once properly run, can sustain itself without much energy or material input. Energy produced from fallen bamboo leaves can fully feed the demand of charcoal and fiber making process. With the help of biologic purification agency, water can be easily reused.

**PRODUCE ON SITE**

Given the size of the field, bamboo harvested, if arranged wisely, is able to be processed on site without occupying too much space.

**MICROCIRCULATION**

In the new village, factory bridges factory, village as well as natural resources. Factories and fields coexist without sacrificing economic benefit.
Bamboo culms are transported into the mechanical plant through a ramp. In the plant, bamboos are cut and split into 1-meter strips and laid on central material shelf for air dry. After harvest season, bamboos can be mechanically treated within a few weeks. For the rest of the year, this space will serve as public space with lovely views of the bamboo forests.

Fiber plant is placed on the opposite side to the mechanical plant with material shelf standing in between. Lounges, toilets and exhibition rooms are placed not only providing necessary comfort for workers, but also making the building a charming spot to gather and visit.

A walkway is installed on top of the material shelf providing alternative route when the ground floor is too busy. What's more important, villagers can walk inside the building seeing people processing bamboo grown on their land. Clients or possible investors can also visit the building without interrupting the production process.

Differentiated spaces are covered by a fluid roof made of bamboo weaving net and bamboo roof tiles. The roof is shaped based on climate concerns. Roof surface covers bamboo frames underneath with a eave of at least 1 meter preventing direct sunlight and rainfall. High slits on top help strengthen natural ventilation discharging redundant heat produced during production process. The roof is shaped like a cone near the kiln preserving heat temporarily in order to help dry the final product quickly.

Climate Strategy
- Protect structure from rain
- Enough Shading
- Indirect Natural lighting
- Letting out redundant heat

Natural Ventilation
- Rain Prevention & Water Collection
- Sun Shading
- Kiln Area Roof Shape & Heat Preserving

NATURAL VENTILATION
RAIN PREVENTION & WATER COLLECTION
SUN SHADING
KILN AREA ROOF SHAPE & HEAT PRESERVING
GROUND FLOOR PLAN

1. Ramp
2. Mechanical plant
3. Exhibition room
4. Entrance lounge
5. Lounge
6. Toilet
7. Fiber plant
8. Material shelf
9. Charcoal Kiln
10. Biogas garden
11. Wetland park
12. Bamboo Plantation
Ground floor is lifted about 1 meter to prevent rainwater from flowing in. Spaces beneath the floor housing water and energy transporting system.

Considering the weather condition in Bandung, there is no enclosed facade, only some fences surrounding areas need protection from random walk in.
INSTALLATION

This factory is mainly funded, built and run by local residents. Thus, a simple, low-price building system is needed. Bamboo construction suits perfectly this requirement. Not only the skills and tools needed for construction can easily be found in the village, nearly all materials can be grown on the earth where this village stands.

35 different handmade frames connected in a linear direction forms the serpentine shape with various interior space. The functional yet playful space is not easily achieved with mass production building system.
MECHANICAL PLANT PERSPECTIVE
FIBER PLANT PERSPECTIVE