

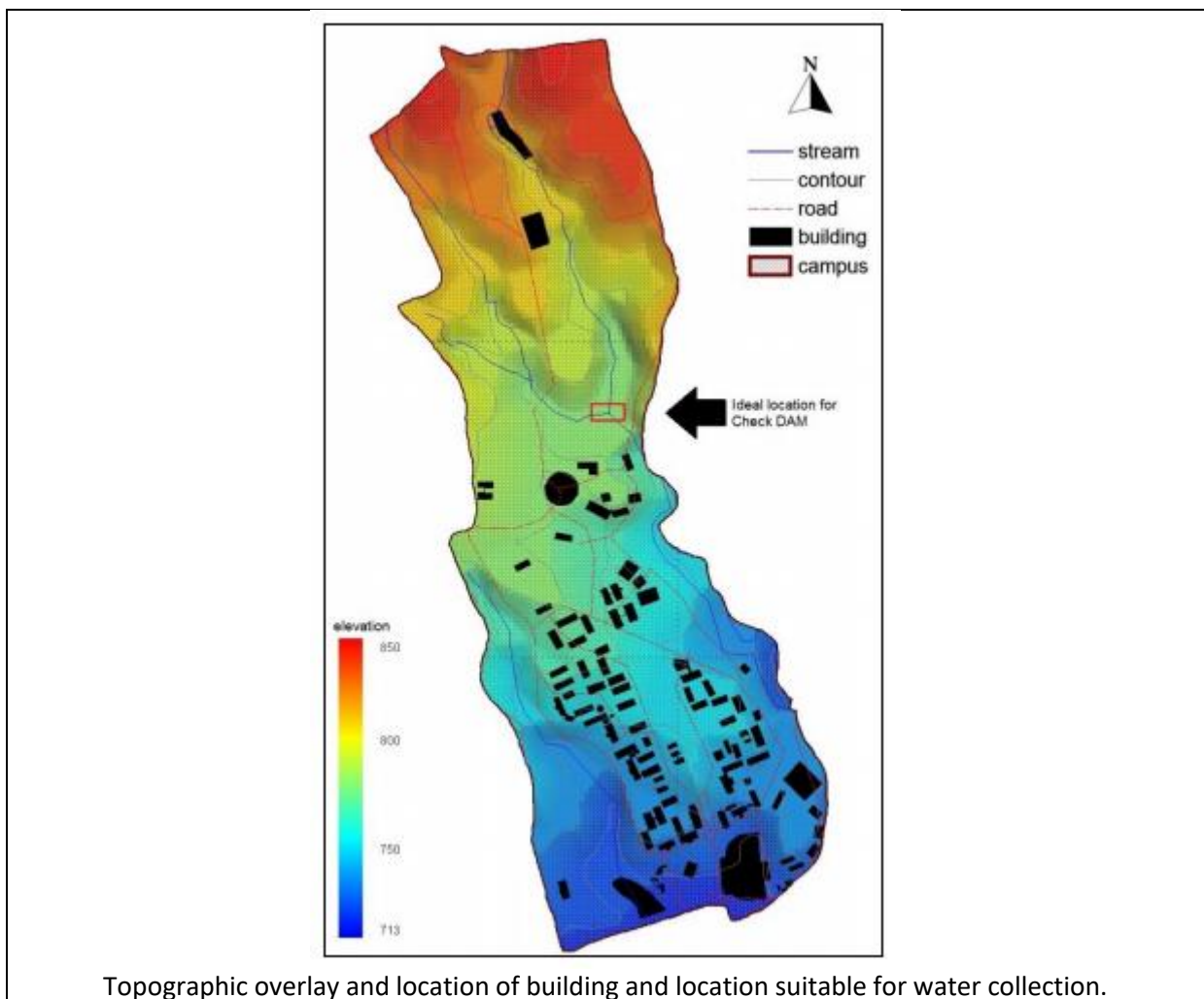


# THE Impact Ranking

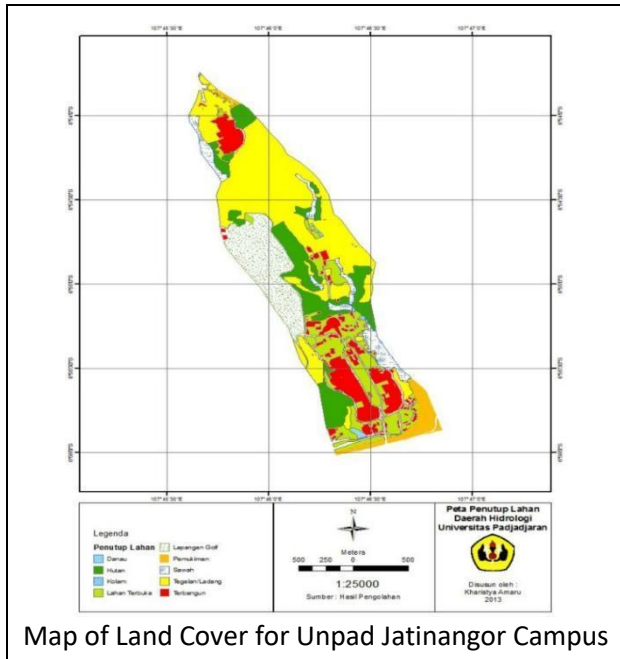
University : Universitas Padjadjaran  
Country : Indonesia  
Web Address : <https://Unpad.ac.id/>

## Water (WR)

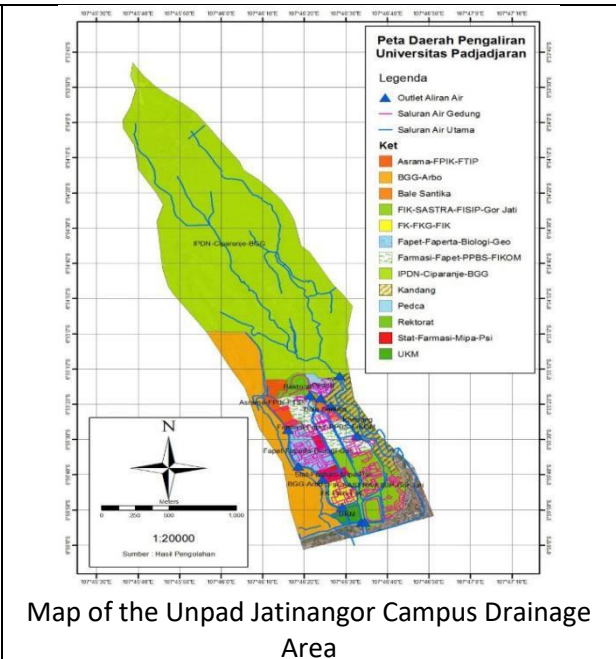
### Water Conservation Program Implementation



Topographic overlay and location of building and location suitable for water collection.



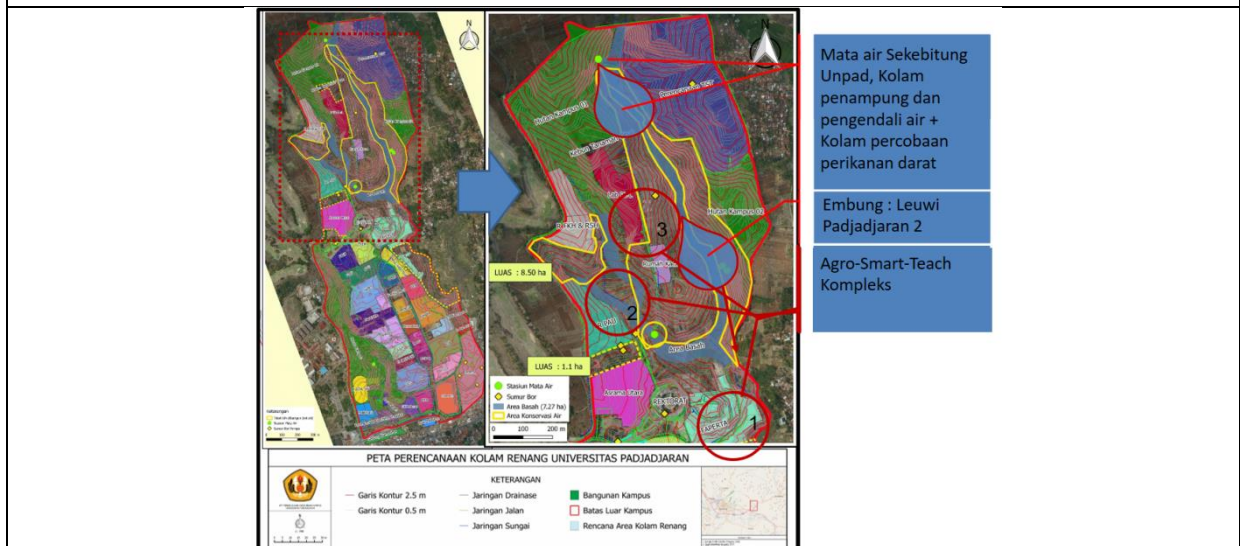
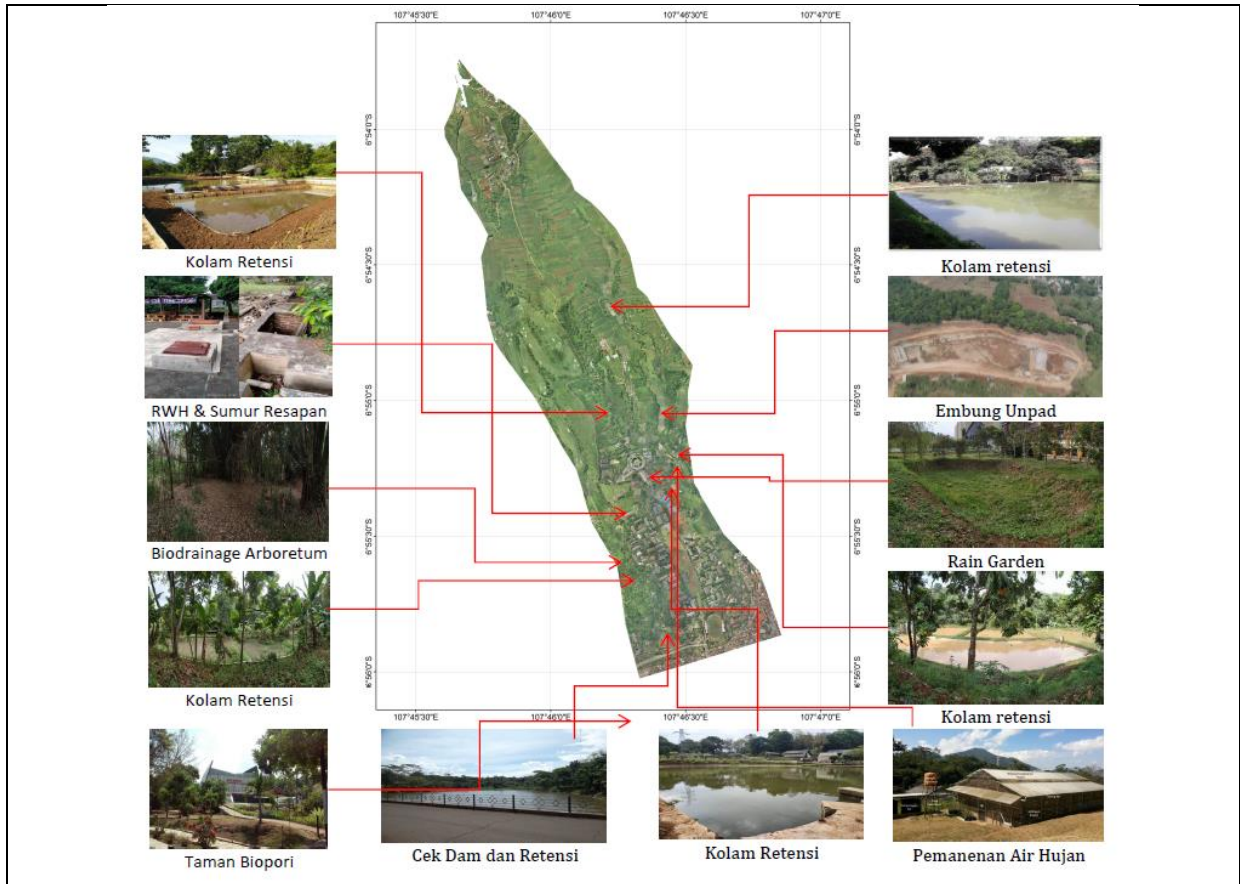
Map of Land Cover for Unpad Jatinangor Campus

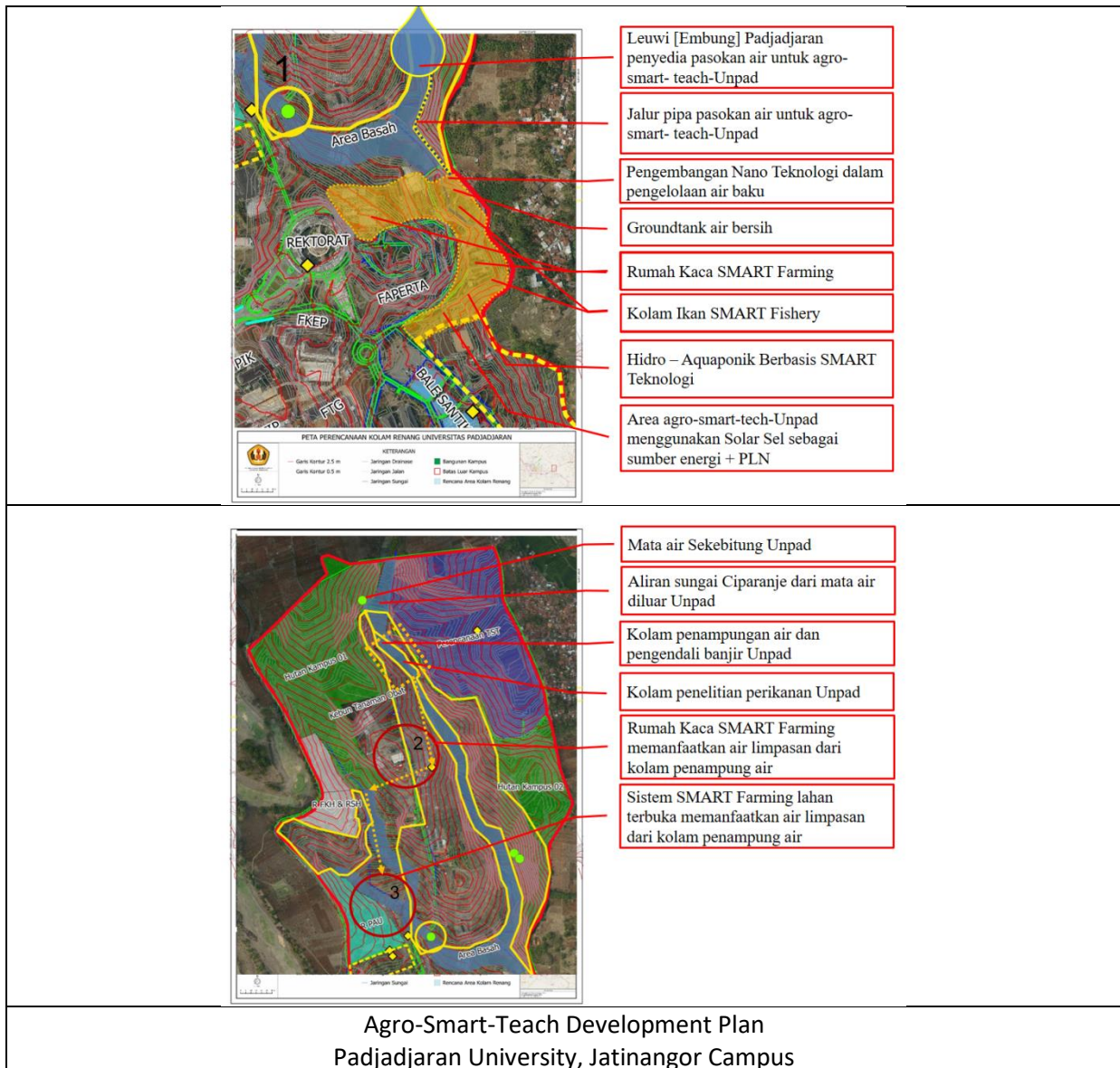


Map of the Unpad Jatinangor Campus Drainage Area



Leuwi Padjadjaran's Ecoparian Exterior Perspective





## WATER CONSERVATION PROGRAM IMPLEMENTATION

### A. Water Conservation Program Implementation

Based on the drainage conditions in the UNPAD Micro watershed area, a water conservation program is prepared to be implemented gradually. Conservation efforts that have been conducted to prevent the surface runoff flow are constructing a basin, check dams, retention ponds, infiltration wells, bio drainage areas, rain garden, rainwater harvesting, and bio pores. In general, the Jatinangor Unpad area has a significant difference in altitude, so it has a slope and has the potential to become a water catchment area. Unpad Campus has regional conditions in the form of ridges and valleys so that it can become a catchment for rainwater that falls to the surface.

#### 1. Arboretum Check Dam



The Unpad Check dam Arboretum area is the last outlet point of the drainage area located on west of the Unpad campus. The check dam in the Unpad area serves to block the flow of surface runoff as well as to provide an opportunity for water to seep into the ground. This Check dam area was built on an area of 0.7 ha with a water holding capacity of approximately 14000 m<sup>3</sup>.



**Drainage at the western side of UNPAD Campus (Arboretum Check Dam)  
dammed to reduce the water runoff coefficient**

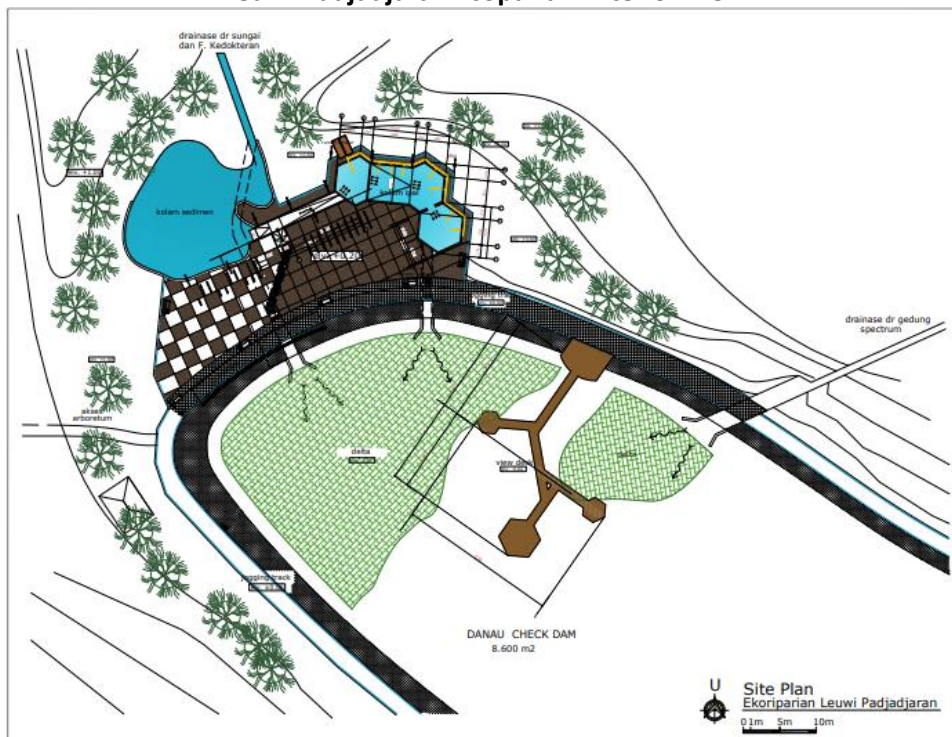
In 2020, Ecoparian Leuwi Padjadjaran will be built in the Check Dam Arboretum area of Unpad. This area will become a multifunctional ecoparian area, in addition to functioning as a water catchment runoff and implementing water conservation programs, this ecoparian development also has a social function where later this area will become a learning center area, a gathering area, and a jogging track



will also be built around the ecoparian. In this ecoparian, an IPAL (*Instalasi Pengeloaan Air Limbah*) or Wastewater Management Installation will also be built. The installation serves to reduce the pollutant load that will enter the Check Dam Arboretum so that the water quality is better and clearer. The purpose of ecoparian development is to make a real contribution to the pollution of domestic waste originating from the Unpad Jatiningor campus and the upstream part of the campus. And Unpad can contribute to reducing pollution in the Citarum River because the air flow from Check dam will lead to the Cibeusi watershed or Cikeruh watershed which will empties into the Citarum river.



**Leuwi Padjadjaran Ecoparian Exterior View**



**Leuwi Padjadjaran Ecoparian Development Plan**



## 2. UNPAD Basin

The Unpad Basin was built to hold and accommodate the flow of surface water from the IPDN-Ciparanje area so that it can reduce the risk of flooding in the downstream area, that is the Unpad area and its surroundings. The Unpad Basin is built on an area of 1 ha with a capacity of 40,000 m<sup>3</sup>. Aside from being the implementation of water conservation programs at Unpad Jatinangor campus, the Unpad Basin is currently also used as a learning area for agrocomplex fields and a place suggestion for water sports training such as rowing.



UNPAD Basin (Before being flooded)





**UNPAD Basin (After being flooded)**

### 3. Retention Ponds

This retention pond is basically built to prevent rainwater or surface runoff water from being wasted directly into the drainage stream and can be accommodated in advance. The retention pond also has a function as an agricultural and fishery pond in the UNPAD area, many residents use this retention pond area as a fishing pond. Unpad has 5 retention pool areas spread over the Ciparanje area, North Pedca, Faperta KNKT Land, Arboretum and the Muncuang garden area behind the rectorate building.



**Retention Ponds in UNPAD Area**





#### 4. Rain Garden

Rain gardens are made to catch rainwater and runoff water from buildings and built-up land which then drains it into the land/planting to be absorbed. The rain garden area in the Unpad Jatiningor area is located in the Rectorate Building area. The area around the rectorate building has the highest height compared to other buildings. By using a gravity, the flow of water will be more easily distributed throughout the campus area so it is very suitable for harvesting rainwater and runoff water.



**Rectorate Rain Garden functions to accommodate and absorb surface runoff from the rectorate building**

#### 5. Rainwater Harvesting

The rainwater harvesting system built in the Unpad Jatiningor area is located in two locations. The first location is the ALG Research Greenhouse FTIP North Pedca area. Water is harvested from the roof of the greenhouse with a catchment area of 150 m<sup>2</sup>, then stored using a toren with a storage capacity of 21000 liters. The harvested rainwater is then used as a source of irrigation water for hydroponic research in the greenhouse. The system was built since 2015 until now.



**Rainwater Harvesting System at the ALG Greenhouse FTIP**

In 2020, the greenhouse and rainwater harvesting system was renovated and expanded with a total new catchment water area of 264 m<sup>2</sup> and the previous rainwater storage capacity plus a ground tank with a capacity of 24 m<sup>3</sup>.



**Rainwater harvesting system development design at the ALG Greenhouse FTIP**

A rainwater harvesting system from the roof of the building was also built in the lecture building of the Department of Agricultural Engineering and Biosiste FTIP. Rainwater is harvested from the roof of the building with a catchment area of 750 m<sup>2</sup> and then drained and stored in the ground tank. The excess flow that is not accommodated is channeled to the infiltration well.



**Rainwater harvesting system at the TPB FTIP building**

## **6. Bio pores Garden and Infiltration Wells**

To reduce runoff that enters the main drainage channel, Unpad builds infiltration wells and biopores gardens. Infiltration wells is built to help infiltration of rainwater into the ground, Unpad itself has 2 infiltration wells located in the old Geology Faculty and the Faculty of Agricultural Industrial Technology. Unpad also has 30 biopore holes located in front of the Faculty of Medicine garden, Bale Aweuhan park (Unpad Grand Mosque), and a park near the east gate.





**Bio pores Garden in front of the UNPAD Grand Mosque**

### 7. **Bio drainage Arboretum**

The arboretum area is a green area in the Unpad Jatinangor campus area, apart from being a green area, the Arboretum also functions as a water catchment area. Rainwater that falls in the western part of the Unpad Jatinangor campus area can be channeled to the arboretum area. In this area the surface runoff flow is retained and absorbed into the soil, then the rest flows to the check dam arboretum.





## Biodrainage Arboretum UNPAD which functions to hold and absorb surface runoff water to the western part of the UNPAD campus

### 8. Tree Planting Program

In 2022, 154 tree seedlings have been planted around the Unpad Basin area, this is done as an effort to increase the water catchment area around the Unpad Basin. This planting is carried out as a continuation of the program of 1000 trees in four years. The Unpad Basin area will later be fully surrounded by these planted trees.



**Additional evidence link** (<https://www.unpad.ac.id/2022/02/unpad-lakukan-revegetasi-di-kawasan-embung-leuwi-padjadjaran-2/>)

Tree planting program is also carried out through Unpad Manglayang Mount Trail Running activities. This activity has a program of "1 runner 1 tree" so that each registrant will contribute a tree seed to be planted. The number of runners in this mountrail run activity is 600 runners so that 600 trees will be planted in the Unpad Jatinangor campus area.



### B. Condition of The Drainage Area at UNPAD Jatinangor Campus (UNPAD Micro-Watershed)

The drainage area of the Unpad Jatinangor campus area (MikroDAS UNPAD) describes the potential for surface runoff and the direction of its flow. Based on the delineation of rainwater catchment limits, the Unpad MikroDAS area is divided into the UNPAD area, Jatinangor Campus, IPDN, BGG and Hegarmanah Village as can be seen in the image below.



**MikroDAS Unpad**

It should also be noted that the land cover above is land cover that covering the Bandung Giri Gahana Golf area, a small area of the Kiarapayung Campground, the IPDN area that used by residents as fields, the UNPAD area and the settlement of Hegarmanah Village at the bottom of UNPAD which is a former railway line (PJKA).



The area of Unpad MicroDAS is quite large, considering the total area is 340 hectares. This area affects the water conditions in the Unpad area. Unpad itself has an area of about 198 hectares, which is 58% of the total hydrological area that affects Unpad's MicroDAS.

Land cover analysis to determine the condition of land cover in the Jatinangor Unpad Campus area, was carried out by digitizing and delineating land boundaries based on the results of aerial photography maps with UAV. The dominant land cover is dry field/field followed by forest and open land as shown in the following table.

Table of Distribution of Land Cover of Unpad's Hydrological Area

Land Use	Area (Ha)	Percentage
Basin/Lake	1.84	0.54%
Forest	50.00	14.67%
Pond	1.1	0.32%
Open Space	45.37	13.31%
Golf Course	43.43	12.74%
Housing	14.63	4.29%
Rice Field	18.32	5.37%
Moor/Field	122.37	36.19%
Built-up Area	43.82	12.86%
<b>TOTAL</b>	<b>340.87</b>	<b>100.00%</b>

A good land cover to absorb water is forest / tree stands. As for the percentage of forest area which is only 14% of the total area, this land cover needs to be added to absorb more water into the soil. In contrast to forest areas, built-up areas can drain a fairly large amount of runoff, reaching 70% - 95% of the total rain that falls in the area. The Unpad MikroDAS area has a total built area of 43.39 ha. The existing built-up areas include buildings and parking lots which are located within Unpad Jatinangor Campus and outside Unpad Jatinangor Campus but can still affect hydrological conditions in Unpad MikroDAS.

From the analysis of the distribution of surface runoff, it is known that the Unpad Jatinangor Campus area is divided into 13 drainage areas. Based on these data, it can be seen that the largest water catchment area is in the IPDN – Ciparanje – BGG area at 64.52%, followed by the BGG-Arboretum area at 11%, as can be seen in the following table.

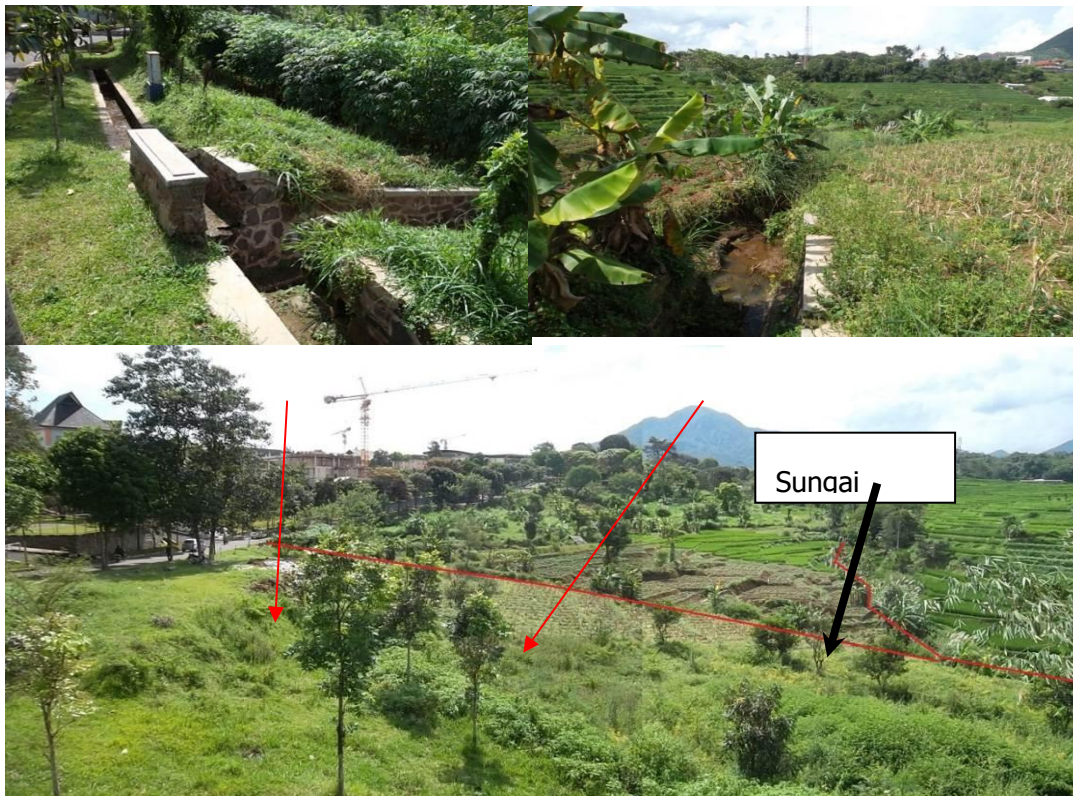
Tabel Luas Wilayah Daerah Pengaliran Kawasan Kampus Unpad Jatinangor

No	Drainage Area	Area m <sup>2</sup>	Percentage
1	BGG-Arboretum	387072.31	11.47
2	Asrama-FPIK-FTIP	51579.03	1.53
3	Fapet-Faperta-Biologi-Geo	84724.32	2.51
4	Stat-Farmasi-Mipa-Psi	35633.47	1.06
5	Farmasi-Fapet-PPBS-FIKOM	142159.37	4.21
6	FK-FKG-FIK	43808.82	1.30



No	Drainage Area	Area m <sup>2</sup>	Percentage
7	IPDN-Ciparanje-BGG	2177601.51	64.52
8	Rektorat	37822.79	1.12
9	Pedca	27750.76	0.82
10	Bale Santika	20488.88	0.61
11	FIK-SASTRA-FISIP-Gor Jati	213884.71	6.34
12	Cages	124386.88	3.69
13	UKM	28410.86	0.84
	<b>TOTAL</b>	<b>3375323.71</b>	<b>100</b>

The direction of surface runoff in the Unpad Campus area is divided into 4 main outlets. The first area includes the Rectorate Building area and its surroundings with a flow outlet to the Rain Garden rectorate. The second area covers the drainage area of BGG-Arboretum, Asrama-FPIK-FTIP, Fapet-Faperta-Biology-Geology, Statistics-Pharmacy-MIPA-Psychology, FK-FKG-FIK and UKM. The third area is in the middle area of FIK-Sastra-Fisip-Gor Jati with outlets in the front gate area of Unpad. Furthermore, the fourth area includes the IPDN-Ciparanje-BGG drainage area, Pharmacy-Fapet-PPBS-Fikom, North Pedca, Bale Santika, and the animal cage area which has an outlet in the Cileles river which then flows into the Cikeruh river.



Drainage on the east side of Unpad campus (in front of FIKOM) to discharge surface water that empties into the Cileles river





Runoff water in the east is flowed out through the drainage system in front of the faculty of communication science and then flowed into the Cileles River. Then for the runoff water in the middle of Unpad campus, the same drainage system is open from top to bottom and will continue to flow out through the old Unpad gate drainage.



Drainage System of Unpad Jatiningor Central Campus

Judging from the type of runoff in the field, the BGG - Arboretum, IPDN - Ciparanje - BGG and Kandang areas are drainage areas that receive a lot of surface runoff from agricultural land, while other drainage areas receive more surface runoff from building roofs and built-up areas such as fields, parking lots and paved roads.

Overall surface runoff flowing in the Unpad MicroDAS area is channeled out of the MicroDAS area into the Cikeruh river. However, more than 50% of the rainwater that falls is retained or conserved within the area in the MicroDAS area. Runoff flow is retained along the conveyance in the form of reservoirs, check dams, retention ponds as well as rain gardens and biodrainage. After being retained and infiltrated, excess surface runoff flow is then channeled through outlets to the Cikeruh River.