WATER ALLOCATION IN THE BRANTAS RIVER BASIN

Jasa Tirta I Public Corporation

2005

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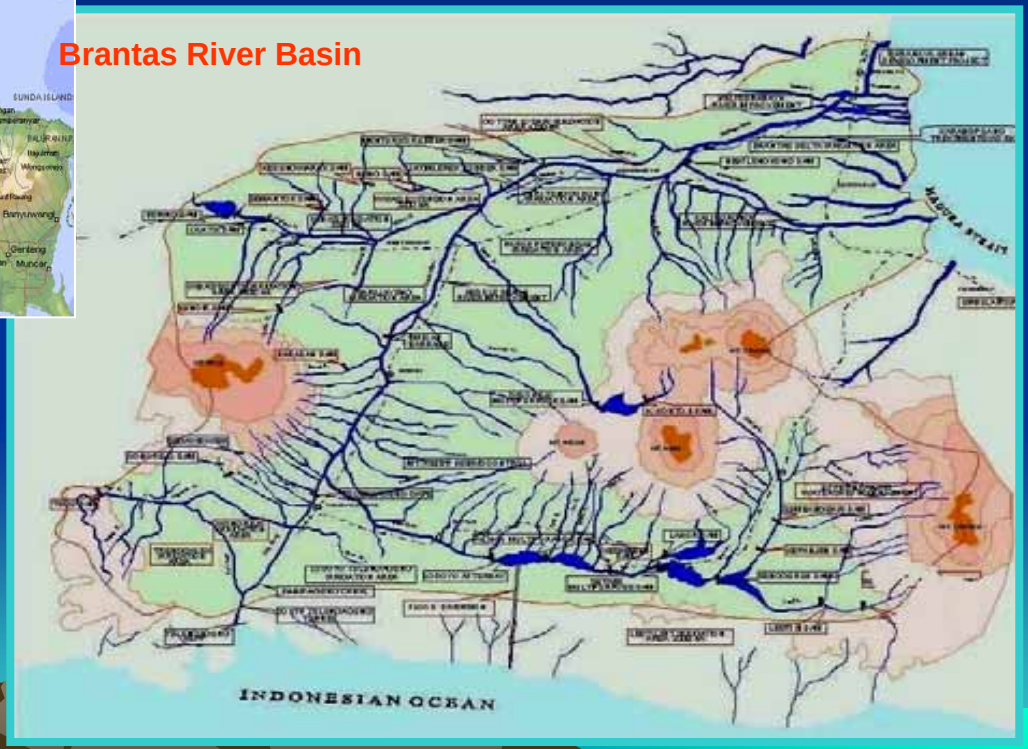
Facts about Brantas River Basin

- One of developed river systems in Indonesia
- Functions as the most important source of water supply in East Java Province
- Support regional and national development benefits: GRDP Brantas Rp. 150,630 billion – approx. US$ 17.66 billion – 59% GRDP E. Java – 8% GRDP National (as of 2003)

Description of Brantas River Basin

- Basin Area : 11,800 km^2 (25% of E. Java)
- Population (2003) : 15.5 million (43% of E. Java)
- Average Rainfall : 2,000 mm/year
- Water Potentials : 12 billion m^3/year
- River Length : 320 km



- Active volcanoes: Mt. Kelud & Mt. Semeru
- Land Use (2004) :
  - paddy field 39.0%
  - dry land 12.0%
  - plantation 22.0%
  - forest 11.0%
  - settlements 12.0%
  - others 4.0%

Development of Brantas Basin

Master Plan I (1961 - 1973) | **Master Plan II (1974 - 1985)** | **Master Plan III (1986 - 2000)**

Total investment (1960-2001) : 7.3 trillions Rp.

(US $ 0.097 billions, ¥ 78,8 billions, 258.9 billions Rp.)

Bening Dam (84)

Waru-Turi B. (92)

Selorejo Dam (72)

Wonorejo Dam (00)

T.Agung Tunnel (91)

Lodoyo Dam (83)

Wlingi Dam (78)

Sutami Dam (72)

Lahor Dam (77)

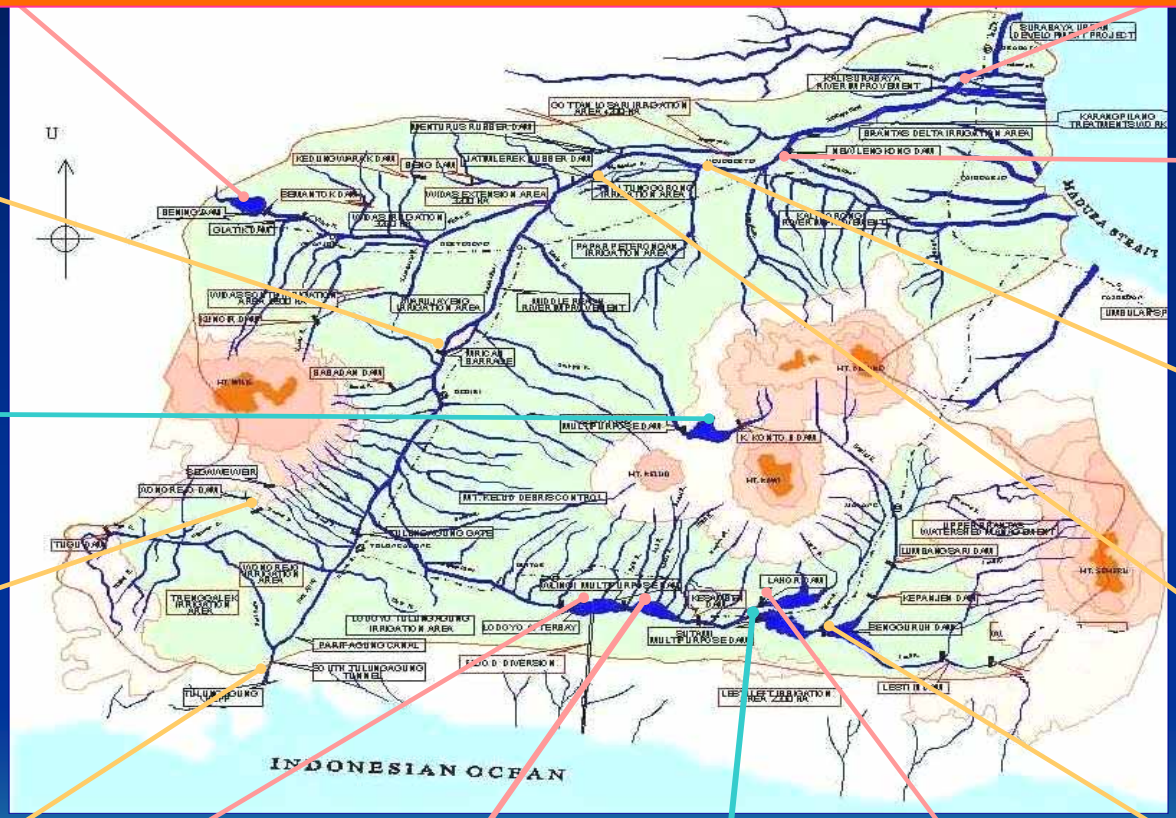
Sengguruh Dam (88)

Menturus R.D (93)

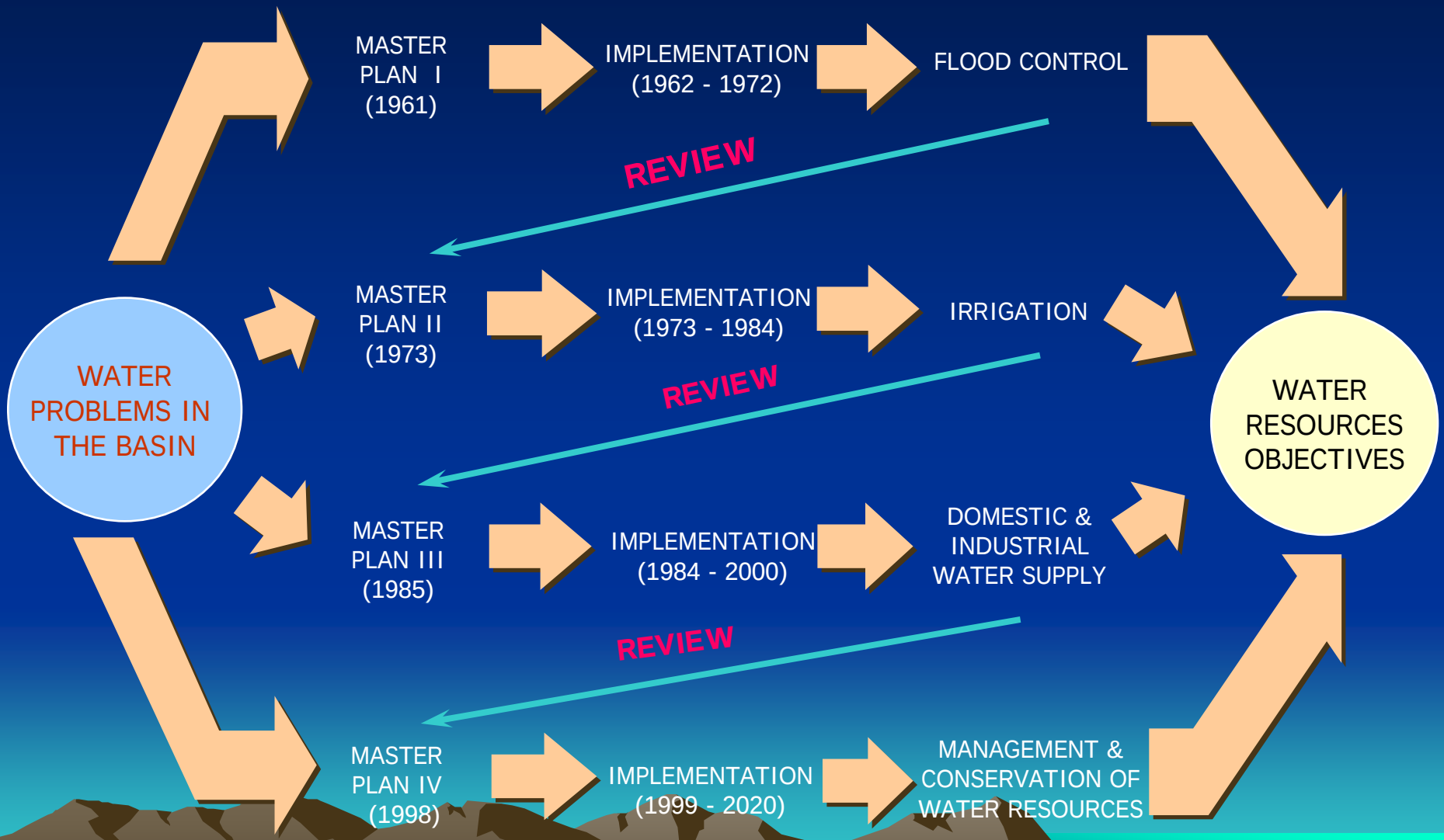
Jatimlerek R.D (93)

Gunungsari B. (81)

New Lengkong B (74)



The Brantas River Basin's Master Plans



Utilization of Water from Brantas in 2004

Electricity = 1.00 billion kWh/year

Irrigation Area= 304,000 ha
(121,000 ha from reservoirs)

Raw Water for Domestic Supply
= 245 Mm^3/year

Raw Water for Industries Supply
=135 Mm^3/year

Maintenance Flow = 204 Mm^3/year
And Flood Control 50 years
Return Period = 60,000 ha

Fisheries = 41 Mm3/year or
about 15,730 ha
(in delta area)

Development Benefits

Beneficiaries	Unit	1960	2004
- Flood Control	Inundated areas	Flooding every year (60.000 ha)	None (main stream)
- Irrigation	Cropping Intensity	0.8 x / year	2.2 x / year (244%)
- Hydropower	Million kWH/year	170 a)	1.000 (588%)
- Raw Water for Domestic	Million m^3/year	73 b)	245 (305%)
- Raw Water for Industries	Million m^3/year	50 c)	135 (270%)

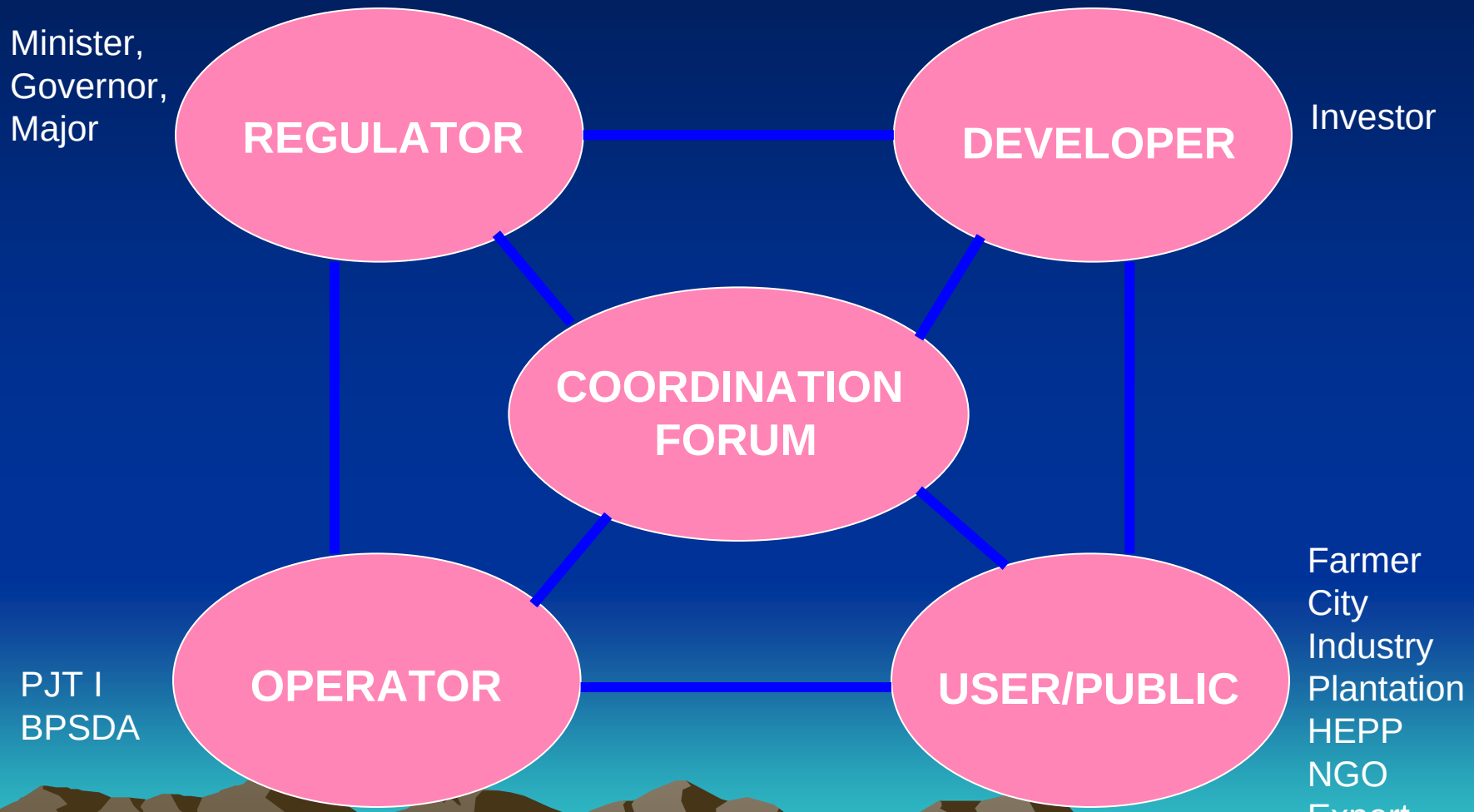
Note:

a) Mendalan and Siman HEPP,

b) Ngagel I dan II Domestic Water Treatment Plants,

c) Sugar factories

WATER RESOURCES MANAGEMENT COORDINATION SYSTEM



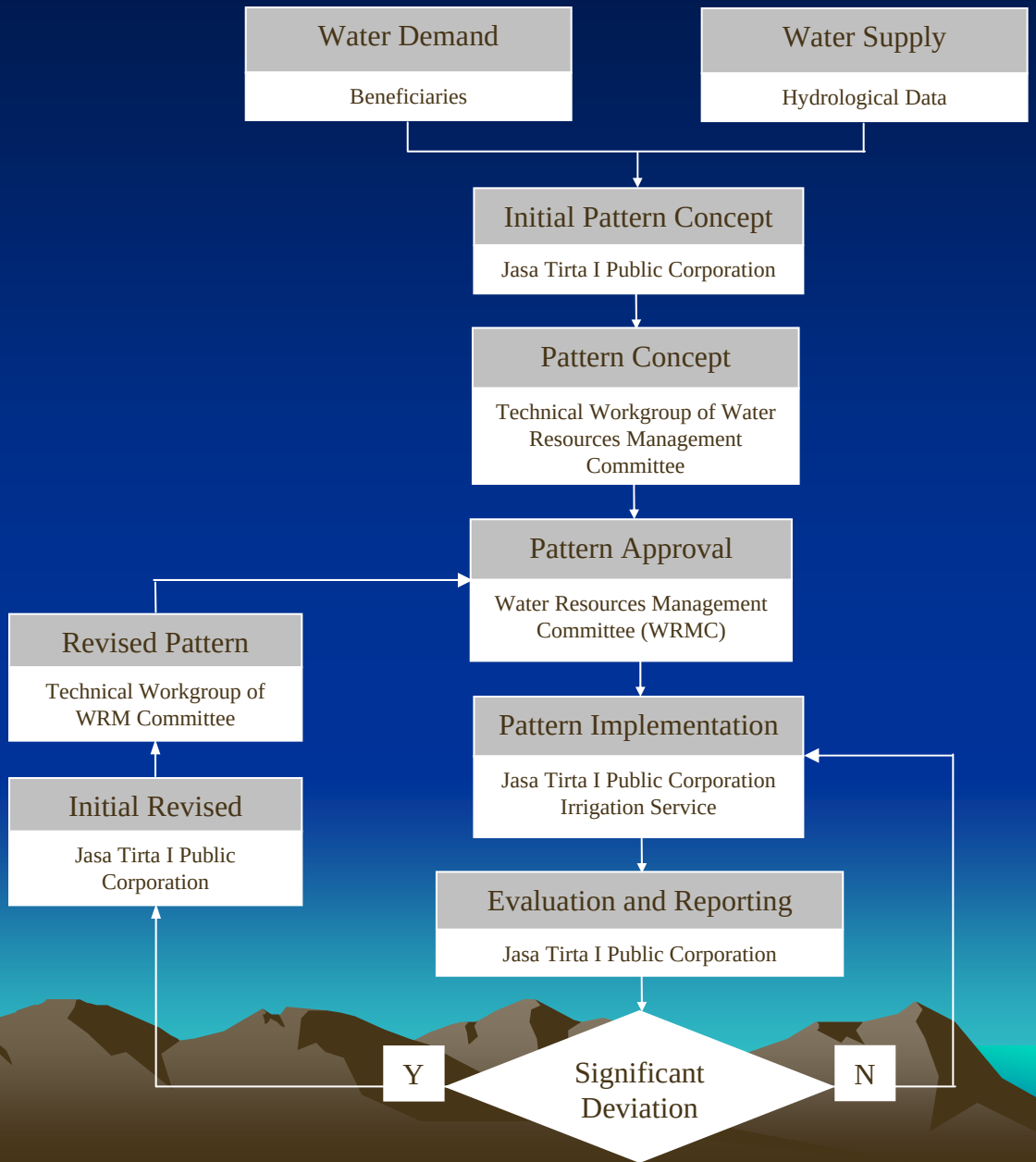
Water Allocation Preparation in the Brantas River Basin (1/2)

- Calculation of water demand (for irrigation, generated electricity, industry, drinking water, fishery, flushing and others) by East Java Water Resources Service (EJWRS) and Jasa Tirta I Public Corporation (*PJT I)*
- Calculation of water availability based on climate, rainfall, inflow and storage prediction
- Preparing draft of reservoir operation pattern by *PJT I*. Reservoir operation pattern is prepared twice a year (wet season and dry season). It is prepared into three (3) alternatives, i.e. wet, normal, and dry pattern

Water Allocation Preparation in the Brantas River Basin (2/2)

- Investigation of reservoir operation pattern is conducted by Technical Team of WRMC and giving suggestion or correction (if necessary) before submitted to Water Resources Management Committee (WRMC)
- WRMC meeting involves discussion, evaluation, and decision making to select one alternative of reservoir operation pattern for guidance at site
- Implementation of the reservoir operation pattern
- Reporting and evaluating of implementation in the site
- Revise on the reservoir operation pattern if it have significant deviation by *PJT I*
- The revision of reservoir operation pattern, afterwards submitted to WRMC to get approval and ratified.

FLOW CHART ON WATER ALLOCATION PREPARATION IN THE BRANTAS RIVER BASIN



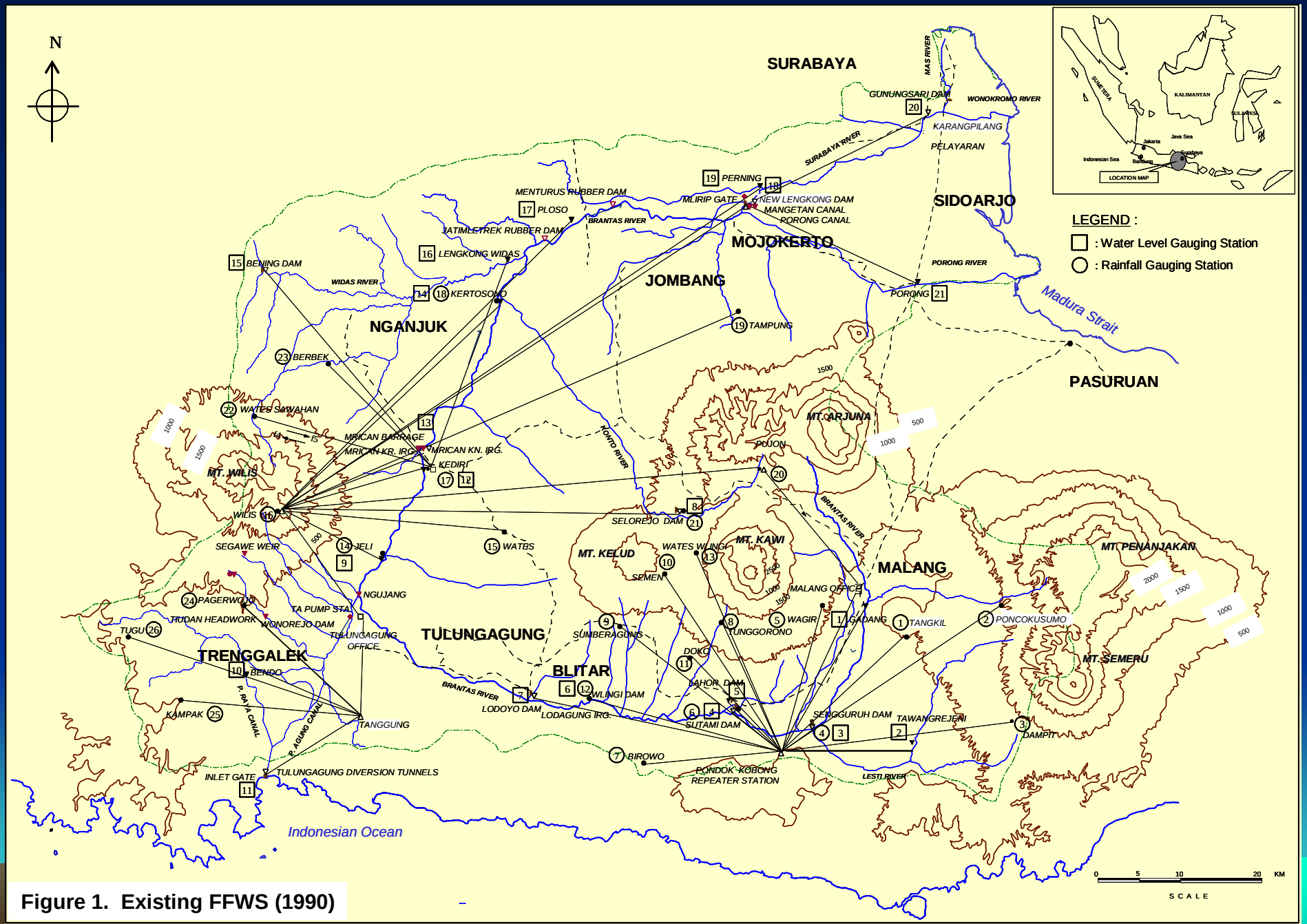


Figure 1. Existing FFWS (1990)

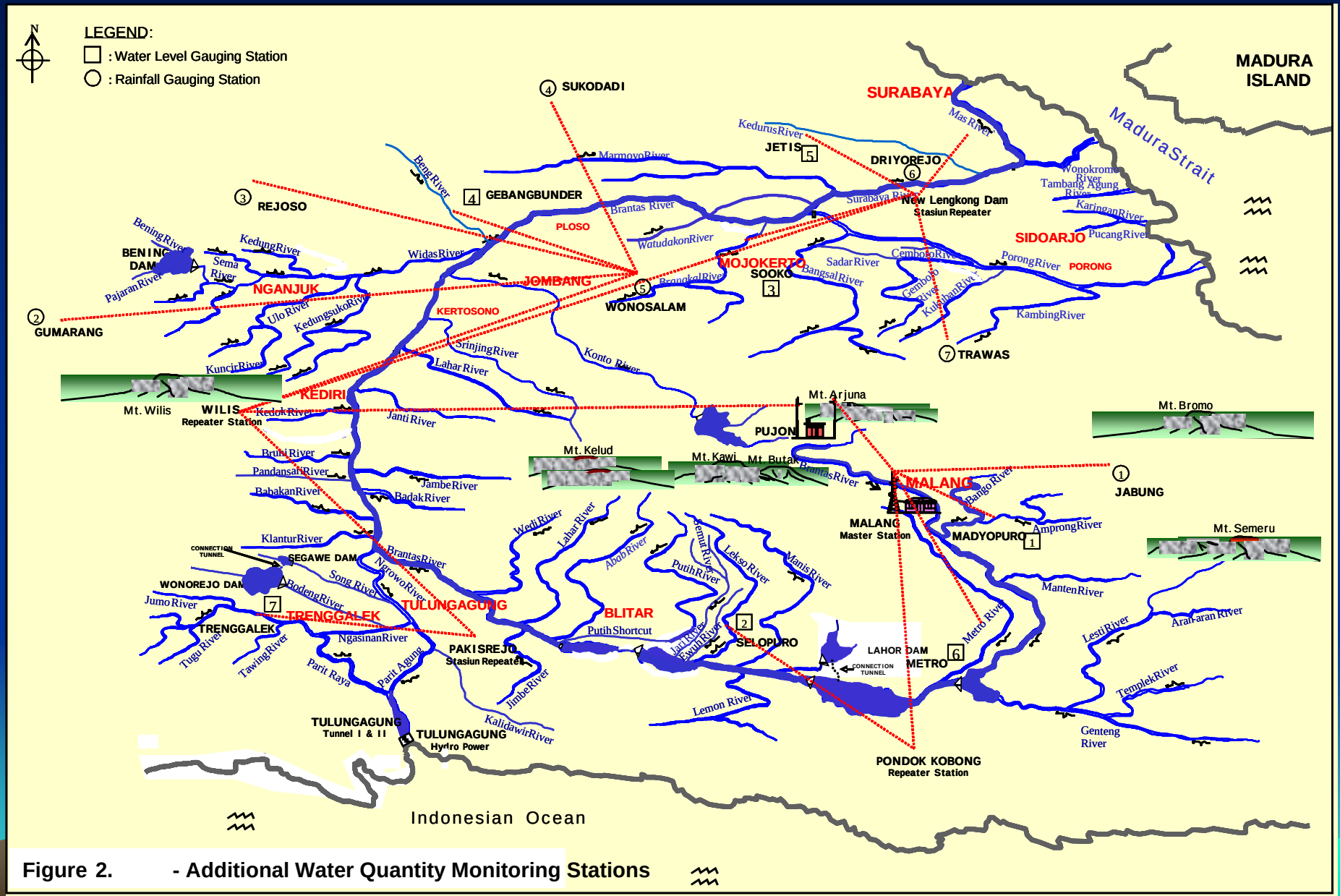


Figure 2. - Additional Water Quantity Monitoring Stations

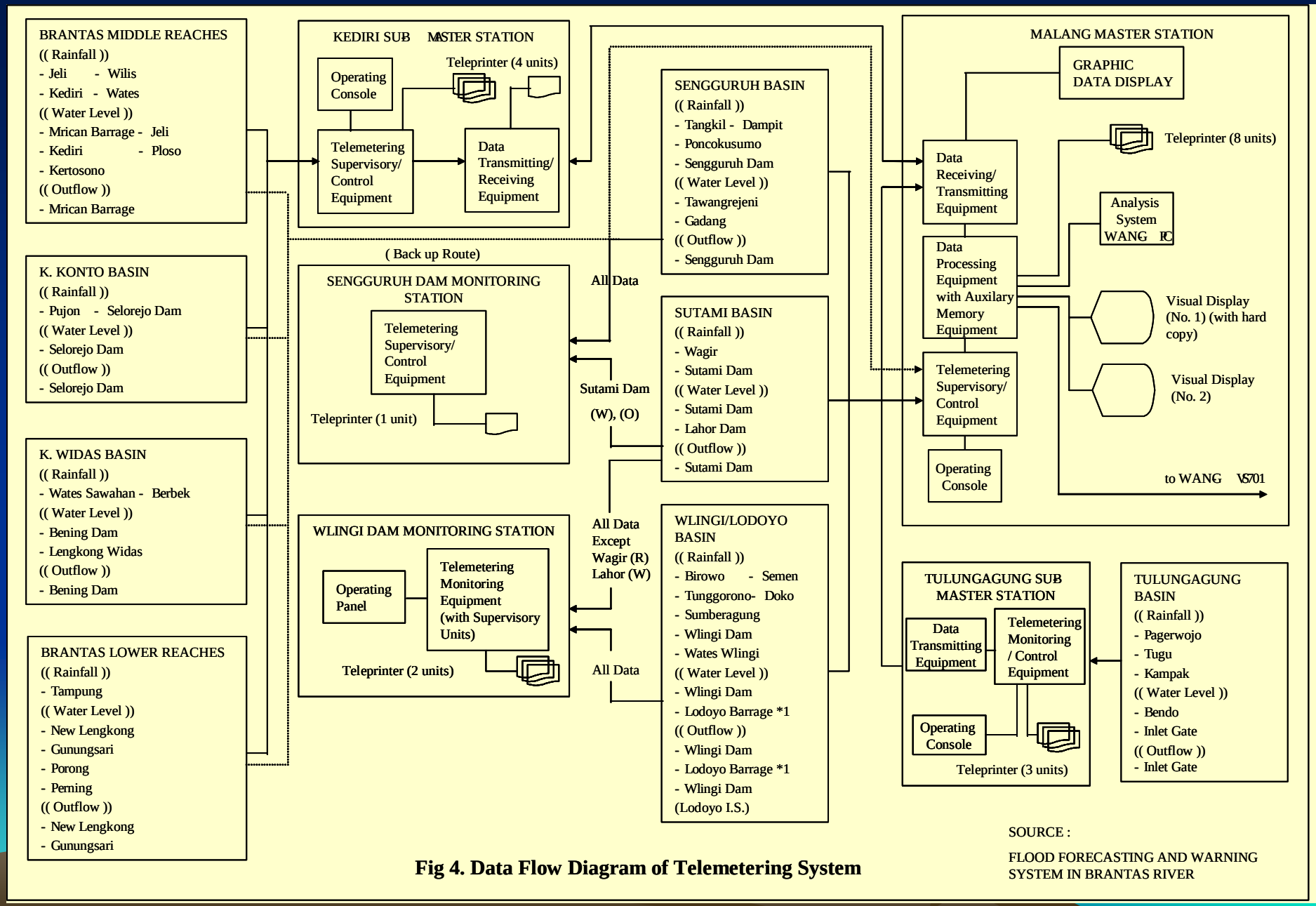


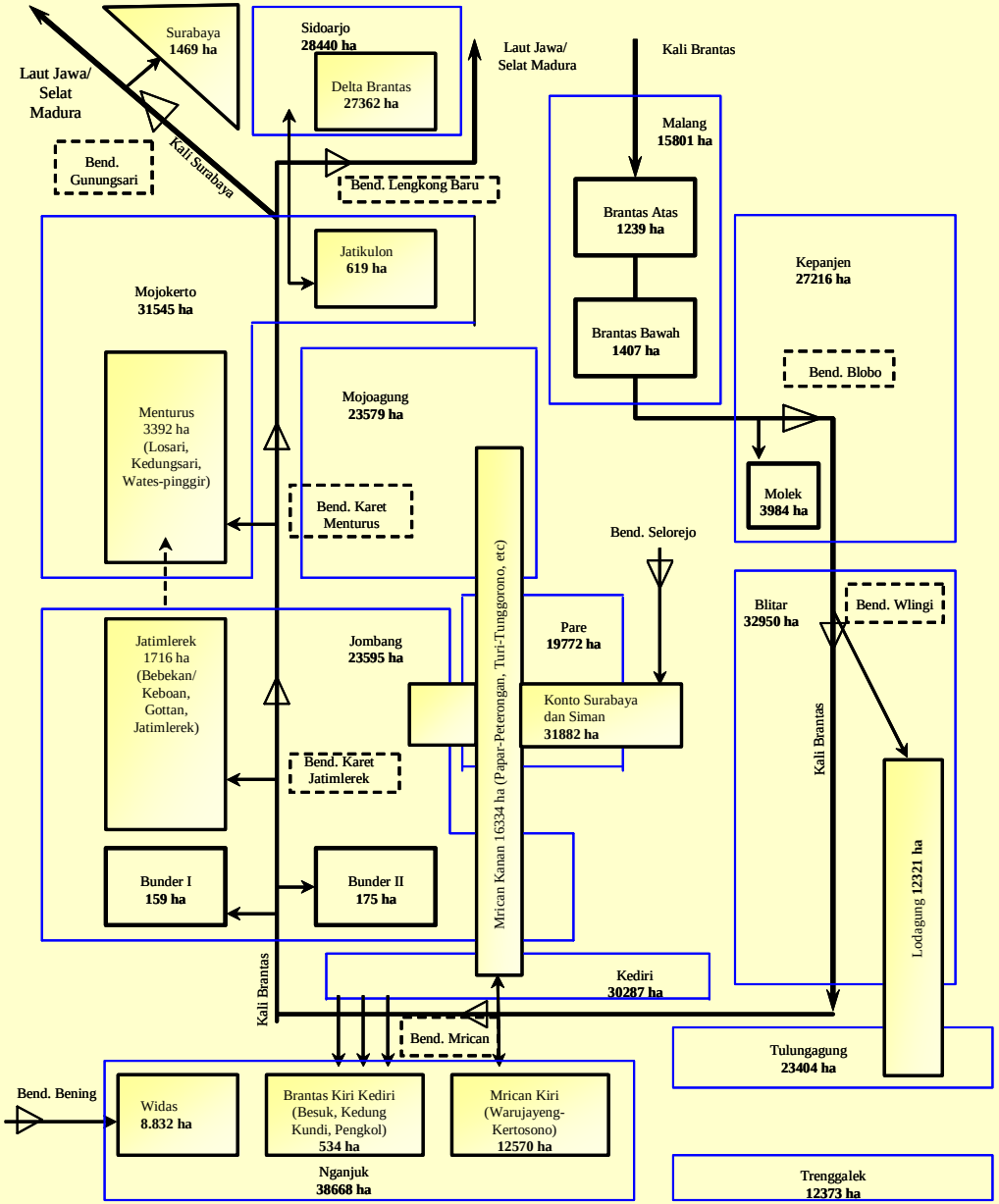
Fig 4. Data Flow Diagram of Telemetering System

SOURCE :

FLOOD FORECASTING AND WARNING SYSTEM IN BRANTAS RIVER

DIRECT IRRIGATION SCHEMES IN BRANTAS RIVER BASIN

FIGURE 2



Keterangan : Nganjuk (38668 Ha) : Nama jaringan/ daerah irigasi (Cabang Dinas Pengairan)
Lodagung (12321 Ha) : Nama jaringan irigasi yang mengambil air dari Kali Brantas
Bend. Blobo : Nama bangunan pengambil air di Kali Brantas

WATER ALOCATION PATERN IN KALI BRANTAS
RAINY SEASON 2004/2005

BLN/DKD		INFLOW	INTAKE IRIGASI IRIGASI DI KALI BRANTAS (M3/DT) *)								INDUSTRI	K. SURA	KESEIM-
		MRICAN	MRICAN	MRICAN	BRTS KIRI	JATI	MENTU-	JATI	DELTA	TOTAL	DI K. BRTS	BAYA +)	BANGAN **)
		(M3/DT)	KANAN	KIRI	KEDIRI	MLEREK	RUS	KULON	BRTS		(M3/DT)	(M3/DT)	(M3/DT)
DES	1	110.58	17.36	13.71	1.06	2.27	3.44	0.29	41.59	79.71	3.00	20.00	7.87
	2	105.26	18.50	18.22	1.11	2.23	3.50	0.46	37.81	81.83	3.00	20.00	0.43
	3	121.79	17.81	19.18	1.00	2.29	3.36	0.64	36.68	80.95	3.00	20.00	17.84
JAN	1	147.79	17.63	19.08	0.96	2.29	3.31	0.79	36.49	80.56	3.00	20.00	44.23
	2	162.60	17.63	18.41	0.92	2.29	3.31	0.78	36.37	79.72	3.00	20.00	59.88
	3	178.21	17.63	18.41	0.93	2.38	3.31	0.91	36.24	79.82	3.00	20.00	75.39
FEB	1	217.58	19.68	18.41	0.93	2.37	3.31	0.91	30.39	76.00	3.00	20.00	118.57
	2	186.54	17.91	18.41	0.93	2.39	3.22	0.90	27.30	71.06	3.00	20.00	92.48
	3	175.80	16.33	18.41	0.93	2.31	3.22	0.90	22.05	64.14	3.00	20.00	88.66
MAR	1	194.93	15.22	17.10	1.04	2.01	3.17	0.85	18.15	57.55	3.00	20.00	114.39
	2	208.24	14.39	15.41	1.14	1.73	2.93	0.81	15.58	51.97	3.00	20.00	133.27
	3	204.14	13.84	13.46	1.13	1.50	2.75	0.81	16.71	50.20	3.00	20.00	130.94
APR	1	182.89	15.02	13.96	1.10	1.42	2.68	0.79	22.14	57.10	3.00	20.00	102.79
	2	172.28	16.17	14.53	0.86	1.42	2.70	0.78	30.22	66.67	3.00	20.00	82.61
	3	165.12	17.14	15.23	0.86	1.42	2.60	0.82	30.58	68.66	3.00	20.00	73.46
MEI	1	142.16	16.31	14.46	0.74	1.27	2.82	0.76	28.01	64.37	3.00	20.00	54.78
	2	100.74	16.32	14.27	0.68	1.14	2.80	0.73	28.80	64.73	3.00	20.00	13.01
	3	93.76	16.03	14.24	0.68	1.01	2.78	0.65	28.04	63.43	3.00	20.00	7.33

Ket : *) termasuk kebutuhan air non- irigasi di saluran ybs. (industri, air minum dll / kalau ada)
+) pada saat terjadi banjir pintu air Mlirip harus ditutup

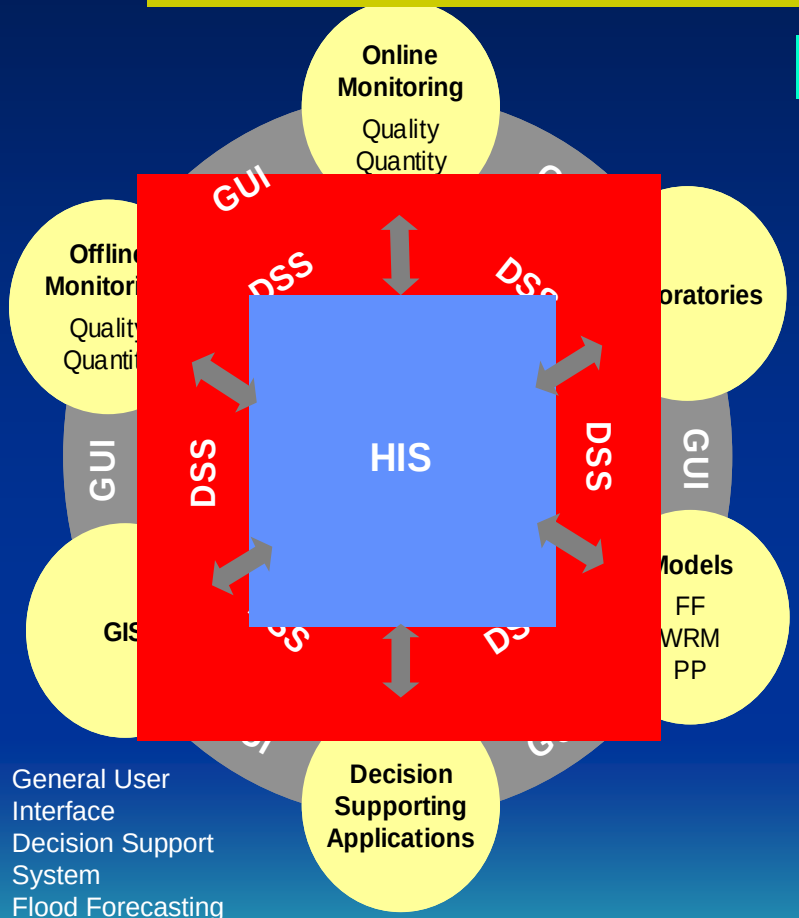
Cat : debit di intake irigasi sesuai (100%) permintaan Dinas PU Pengairan (fax diterima tgl 4 Nop 2004)

WATER ALOCATION PATTERN
DRY SEASON 2005

BLN/DKD		INFLOW MRICAN (M3/DT)	INTAKE IRIGASI IRIGASI DI KALI BRANTAS (M3/DT) *) MRICAN KANAN	MRICAN KIRI	BRTS KIRI KEDIRI	JATI MLEREK	MENTU-RUS	JATI KULON	DELTA BRTS	TOTAL	INDUSTRI DI K. BRTS (M3/DT)	K. SURA BAYA+) (M3/DT)	KESEIM-BANGAN **) (M3/DT)
JUN	1	75.73	16.26	13.92	0.54	1.25	1.51	0.67	17.67	51.82	3.00	20.00	0.91
	2	72.38	15.25	13.92	0.55	0.97	1.45	0.67	15.88	48.69	3.00	20.00	0.69
	3	64.32	13.48	13.15	0.54	0.82	1.50	0.67	10.91	41.07	3.00	20.00	0.25
JUL	1	60.62	12.21	10.47	0.53	0.67	1.63	0.67	11.27	37.46	3.00	20.00	0.17
	2	59.70	11.13	9.07	0.44	0.67	2.00	0.67	12.36	36.35	3.00	20.00	0.35
	3	53.79	9.44	6.75	0.30	0.67	2.05	0.67	10.26	30.15	3.00	20.00	0.65
AGS	1	53.62	10.64	6.33	0.26	0.67	1.79	0.52	10.29	30.50	3.00	20.00	0.12
	2	53.95	9.45	6.33	0.26	0.67	1.82	0.28	9.74	28.55	3.00	20.00	2.40
	3	50.99	8.65	6.33	0.26	0.68	1.89	0.17	9.09	27.08	3.00	20.00	0.91
SEP	1	50.82	8.51	6.48	0.26	0.50	1.92	0.18	9.86	27.70	3.00	20.00	0.11
	2	51.32	8.51	6.58	0.26	0.50	1.91	0.18	9.51	27.45	3.00	20.00	0.87
	3	53.63	8.51	6.65	0.27	0.50	1.80	0.18	11.80	29.71	3.00	20.00	0.92
OKT	1	55.09	9.40	6.80	0.45	0.84	1.79	0.20	11.73	31.21	3.00	20.00	0.88
	2	56.08	9.49	6.91	0.47	1.07	1.91	0.34	10.80	30.98	3.00	20.00	2.10
	3	60.24	10.81	6.14	0.67	1.58	1.84	0.62	10.94	32.60	3.00	20.00	4.63
NOP	1	66.33	12.50	7.40	0.61	1.91	2.33	0.64	14.68	40.08	3.00	20.00	3.25
	2	77.72	16.80	8.04	0.64	2.17	2.63	0.69	19.89	50.86	3.00	20.00	3.85
	3	99.23	16.14	10.30	0.70	2.57	2.92	0.68	38.92	72.23	3.00	20.00	4.00

Information Technology

(The Online-Monitoring Data Integrates with the Brantas Hydrological Information System / BHIS Based on a Central Database)



GUI General User Interface
DSS Decision Support System
FF Flood Forecasting
WRM Water Resource Management
PP Pollution Propagation
GIS Geographical Information System

Pusat Database

Manajemen dari semua data kimia, phisik, biologi, hidraulik sebaik data yang terkait dengan lingkungan dan klimatologi untuk pengelolaan secara luas dari kualitas air dan kuantitas didalam derah pengaliran sungai

General User Interface for Data of ...

1. Online Monitoring Systems
2. Simulation Applications
3. Water Quality Laboratories
4. Decision Supporting Applications
5. Offline Monitoring Systems
6. Geographical Information System

The Brantas HIS Forms a Powerful Decision Support System

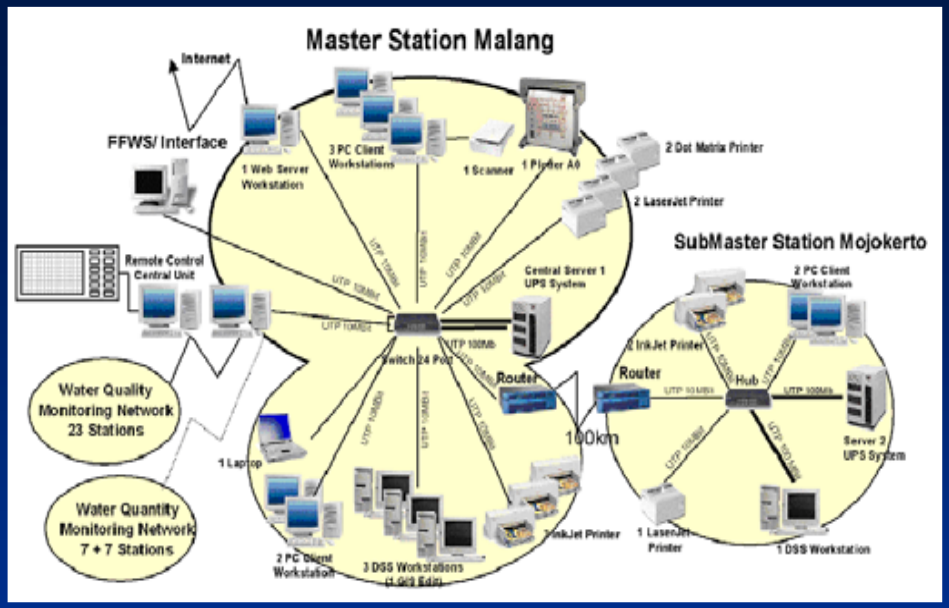


Figure 1. Schematic overview HW Equipment Master Submaster Station

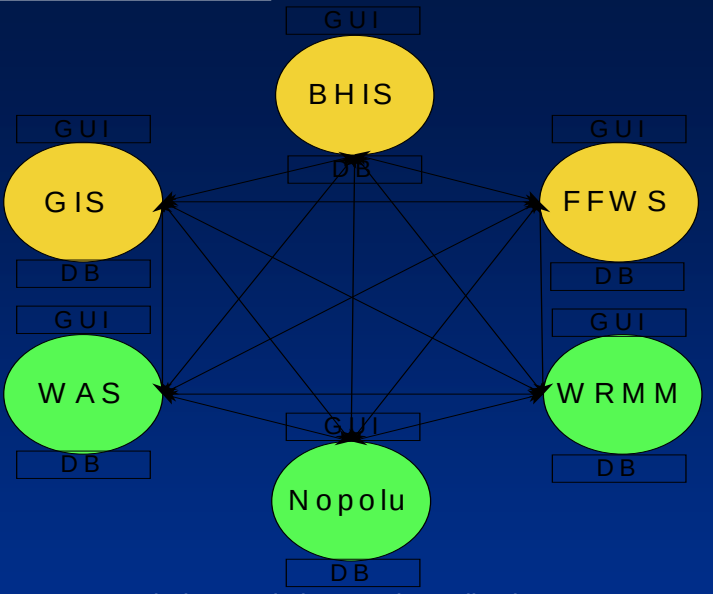


Figure 2. Stand-alone Solution: Each Application communicates to the others through a complex, deregulated Data Transfer Network

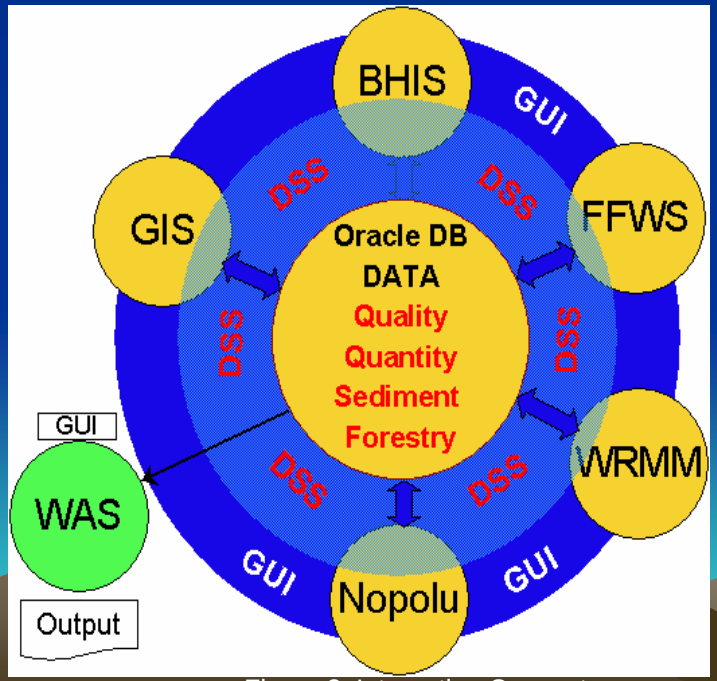


Figure 3. Integration Concept

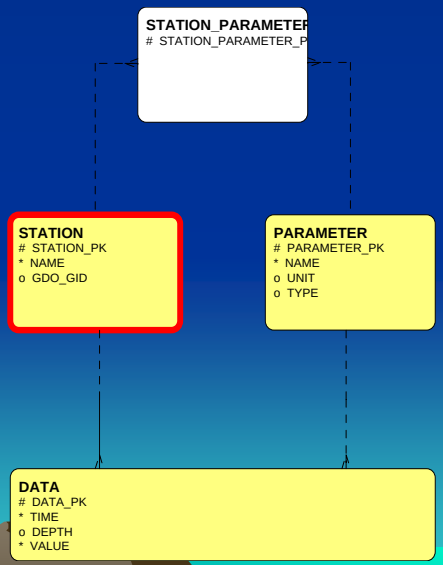


Figure 4. Example of Tables and their Relations

BRANTAS HYDROLOGICAL INFORMATION SYSTEM

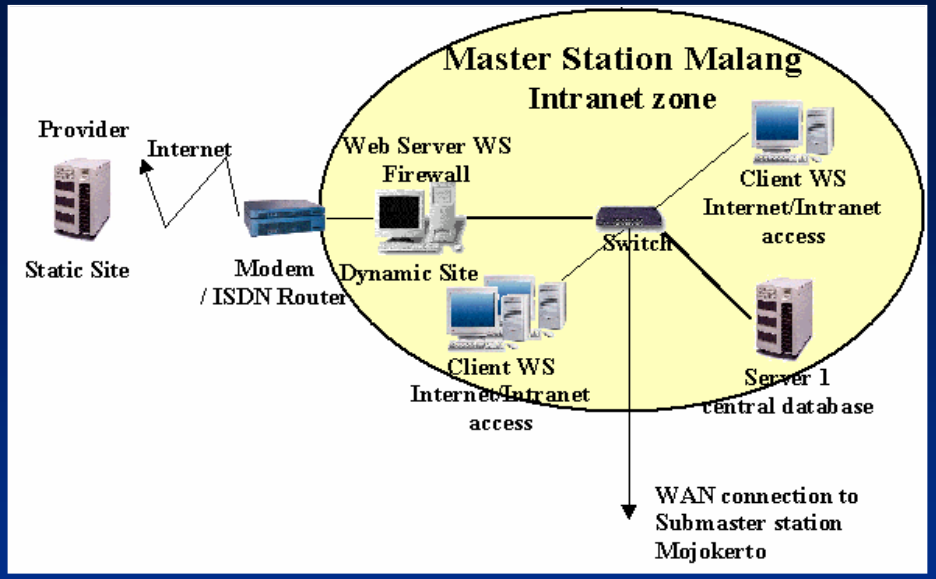
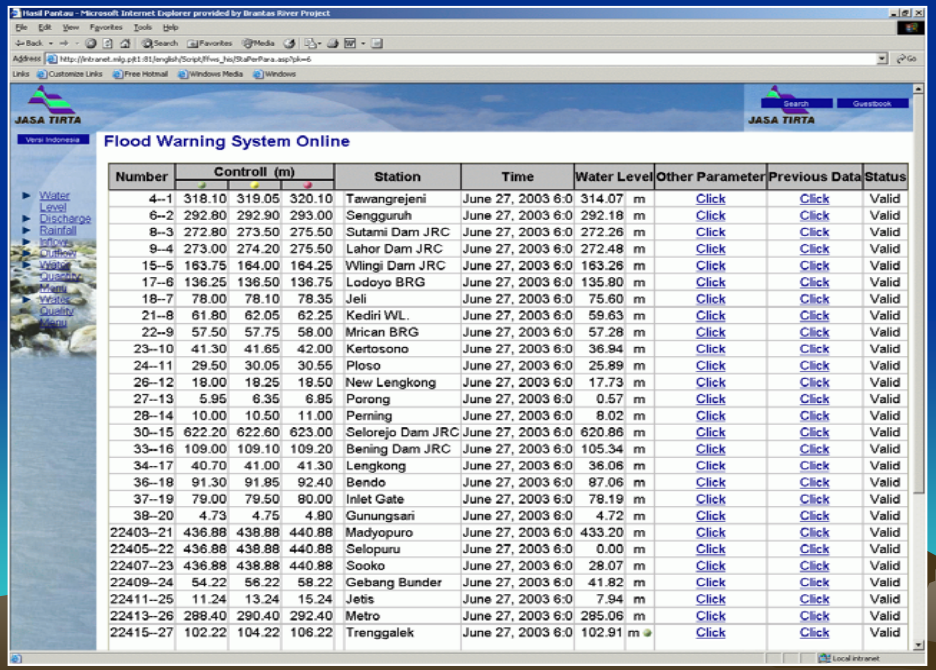


Figure 9 Schematic Brantas Home Page Intranet/Internet

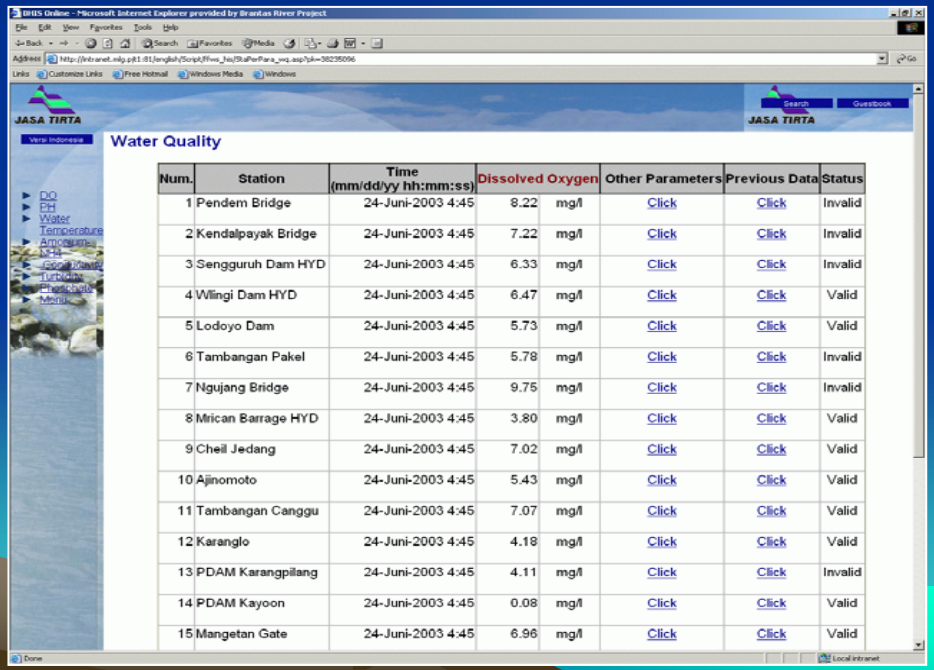
Brantas Home Page - Main Page



Flood Warning System Online

Number	Controll (m)			Station	Time	Water Level	Other Parameter	Previous Data	Status
4--1	318.10	319.05	320.10	Tawangrejeni	June 27, 2003 6:0	314.07 m	Click	Click	Valid
6--2	292.80	292.90	293.00	Sengguruh	June 27, 2003 6:0	292.18 m	Click	Click	Valid
8--3	272.80	273.50	275.50	Sutami Dam JRC	June 27, 2003 6:0	272.26 m	Click	Click	Valid
9--4	273.00	274.20	275.50	Lahor Dam JRC	June 27, 2003 6:0	272.48 m	Click	Click	Valid
15--5	163.75	164.00	164.25	Wlingi Dam JRC	June 27, 2003 6:0	163.26 m	Click	Click	Valid
17--6	136.25	136.50	136.75	Lodoyo BRG	June 27, 2003 6:0	135.80 m	Click	Click	Valid
18--7	78.00	78.10	78.35	Jeli	June 27, 2003 6:0	75.60 m	Click	Click	Valid
21--8	61.80	62.05	62.25	Kediri WL.	June 27, 2003 6:0	59.63 m	Click	Click	Valid
22--9	57.50	57.75	58.00	Mrican BRG	June 27, 2003 6:0	57.28 m	Click	Click	Valid
23--10	41.30	41.65	42.00	Kertosono	June 27, 2003 6:0	36.94 m	Click	Click	Valid
24--11	29.50	30.05	30.55	Ploso	June 27, 2003 6:0	25.89 m	Click	Click	Valid
26--12	18.00	18.25	18.50	New Lengkong	June 27, 2003 6:0	17.73 m	Click	Click	Valid
27--13	5.95	6.35	6.85	Porong	June 27, 2003 6:0	0.57 m	Click	Click	Valid
28--14	10.00	10.50	11.00	Perning	June 27, 2003 6:0	8.02 m	Click	Click	Valid
30--15	622.20	622.60	623.00	Selorejo Dam JRC	June 27, 2003 6:0	620.86 m	Click	Click	Valid
33--16	109.00	109.10	109.20	Bening Dam JRC	June 27, 2003 6:0	105.34 m	Click	Click	Valid
34--17	40.70	41.00	41.30	Lengkong	June 27, 2003 6:0	36.06 m	Click	Click	Valid
36--18	91.30	91.85	92.40	Bendo	June 27, 2003 6:0	87.06 m	Click	Click	Valid
37--19	79.00	79.50	80.00	Inlet Gate	June 27, 2003 6:0	78.19 m	Click	Click	Valid
38--20	4.73	4.75	4.80	Gunungsari	June 27, 2003 6:0	4.72 m	Click	Click	Valid
22403--21	436.88	438.88	440.88	Madyopuro	June 27, 2003 6:0	433.20 m	Click	Click	Valid
22405--22	436.88	438.88	440.88	Selopuro	June 27, 2003 6:0	0.00 m	Click	Click	Valid
22407--23	436.88	438.88	440.88	Sooko	June 27, 2003 6:0	28.07 m	Click	Click	Valid
22409--24	54.22	56.22	58.22	Gebang Bunder	June 27, 2003 6:0	41.82 m	Click	Click	Valid
22411--25	11.24	13.24	15.24	Jetis	June 27, 2003 6:0	7.94 m	Click	Click	Valid
22413--26	288.40	290.40	292.40	Metro	June 27, 2003 6:0	285.06 m	Click	Click	Valid
22415--27	102.22	104.22	106.22	Trenggalek	June 27, 2003 6:0	102.91 m	Click	Click	Valid

Brantas Home Page – Water Quantity On-Line Viewing



Water Quality

Num.	Station	Time (mm/dd/yy hh:mm:ss)	Dissolved Oxygen		Other Parameters	Previous Data	Status
1	Pendem Bridge	24-Juni-2003 4:45	8.22	mg/l	Click	Click	Invalid
2	Kendalpayak Bridge	24-Juni-2003 4:45	7.22	mg/l	Click	Click	Invalid
3	Sengguruh Dam HYD	24-Juni-2003 4:45	6.33	mg/l	Click	Click	Invalid
4	Wlingi Dam HYD	24-Juni-2003 4:45	6.47	mg/l	Click	Click	Valid
5	Lodoyo Dam	24-Juni-2003 4:45	5.73	mg/l	Click	Click	Valid
6	Tambangan Pakel	24-Juni-2003 4:45	5.78	mg/l	Click	Click	Invalid
7	Ngujang Bridge	24-Juni-2003 4:45	9.75	mg/l	Click	Click	Invalid
8	Mrican Barrage HYD	24-Juni-2003 4:45	3.80	mg/l	Click	Click	Valid
9	Cheil Jedang	24-Juni-2003 4:45	7.02	mg/l	Click	Click	Valid
10	Ajinomoto	24-Juni-2003 4:45	5.43	mg/l	Click	Click	Valid
11	Tambangan Canggu	24-Juni-2003 4:45	7.07	mg/l	Click	Click	Valid
12	Karanglo	24-Juni-2003 4:45	4.18	mg/l	Click	Click	Valid
13	PDAM Karangpilang	24-Juni-2003 4:45	4.11	mg/l	Click	Click	Invalid
14	PDAM Kayoon	24-Juni-2003 4:45	0.08	mg/l	Click	Click	Valid
15	Mangetan Gate	24-Juni-2003 4:45	6.96	mg/l	Click	Click	Valid

Brantas Home Page – Water Quality On-Line Viewing

Conclusion

- Present water uses in the Brantas River and its main tributaries i.e. for electricity generation, irrigation, brackish water fishponds, domestic water supply, industrial water supply and river maintenance flow will cause potential conflict among water users due to water shortage in the basin.
- To avoid conflict among water users in the Brantas River basin, a provincial Water Resources Management Committees (*Panitia Tata Pengaturan Air*/PTPA) was established based on the East Java Governor's Decree No. 59 of 1994. Until now, this committee has successfully become an essential coordination among stakeholders in allocating water in the basin, but should be improved its membership and advance its capacity in the future.

Thank you for attention