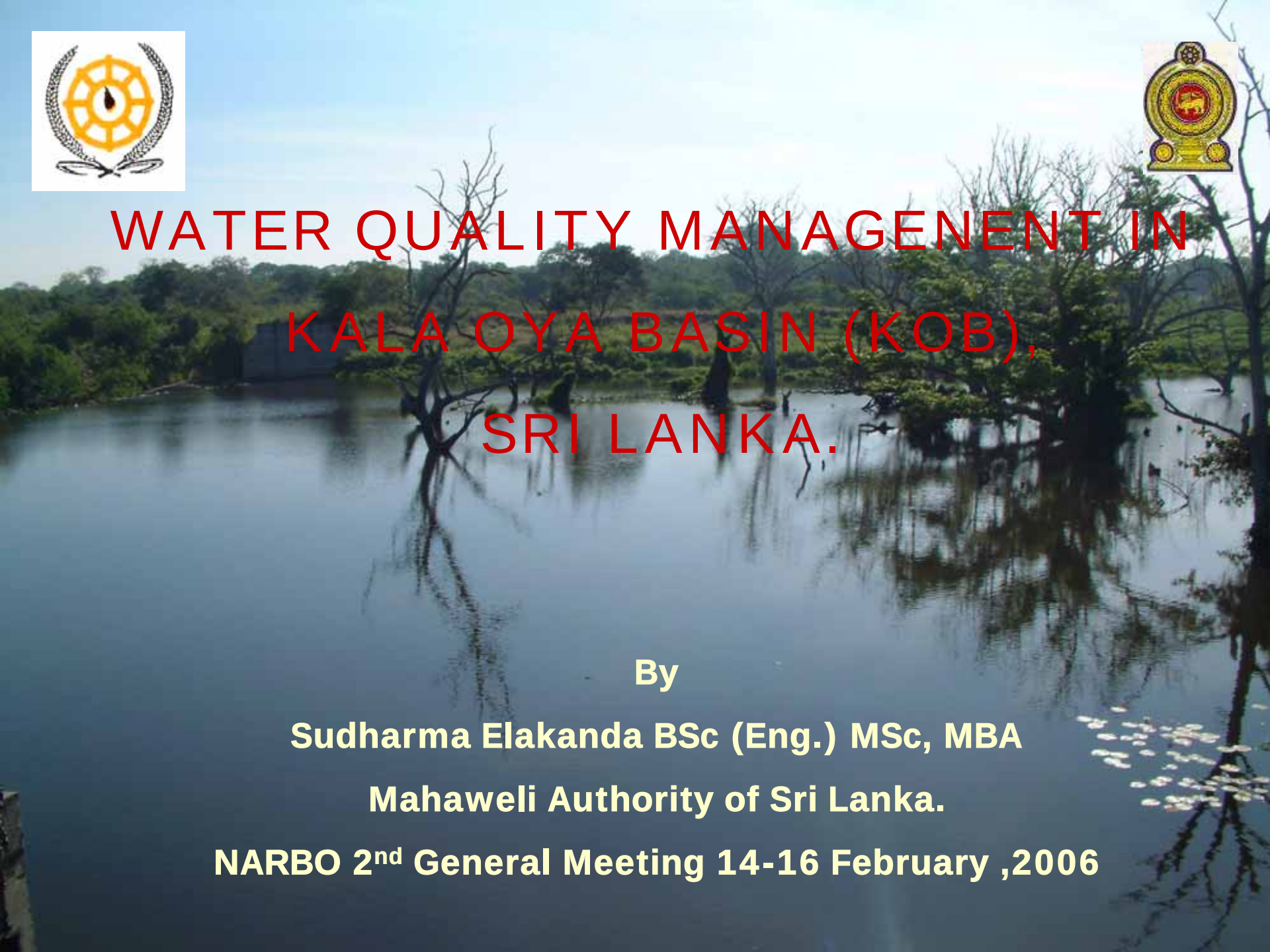

WATER QUALITY MANAGENENT IN KALA OYA BASIN (KOB), SRI LANKA.

By

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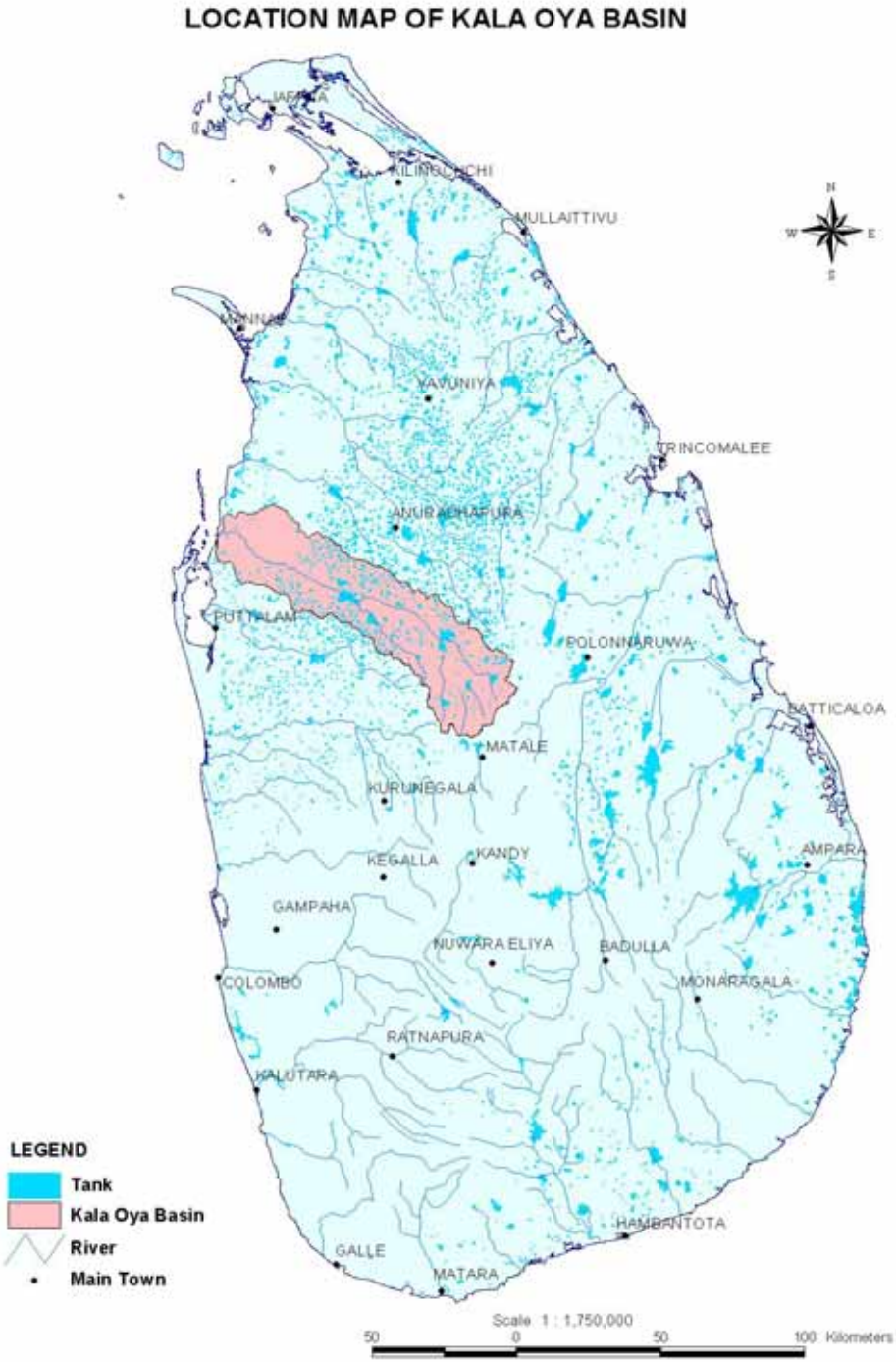
Mahaweli Authority of Sri Lanka.

NARBO 2nd General Meeting 14-16 February ,2006

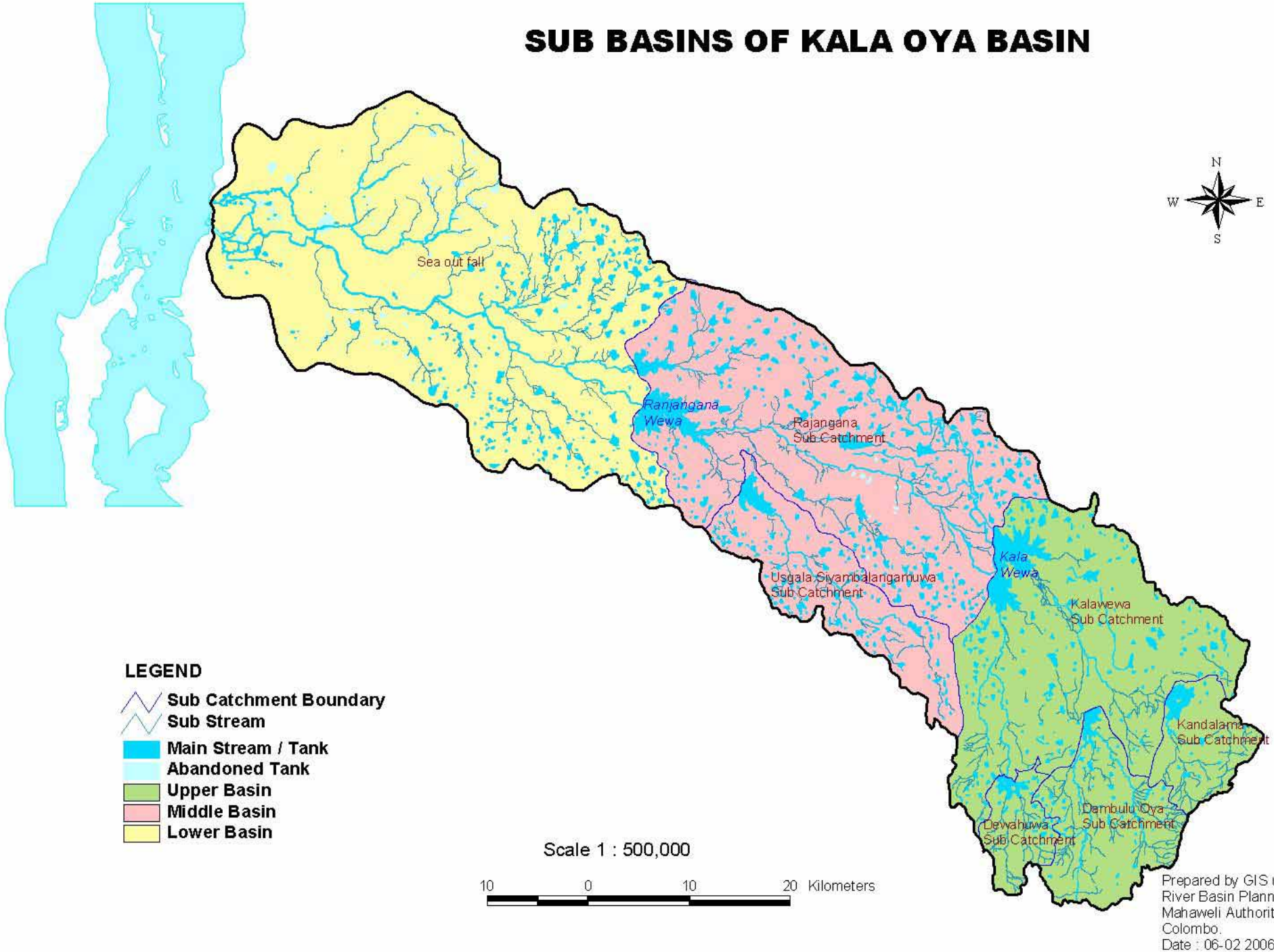
Water Quality (WQ) Management

- ☹ Introduction
- ☹ Current Status of WQ Problems in KOB in Recent Years
- ☹ What Action MASL has taken so far?
- ☹ WQ Assessment in KOB
- ☹ Adverse impact of WQ problem
- ☹ What we will do for minimizing WQ Problem?
- ☹ Conclusion

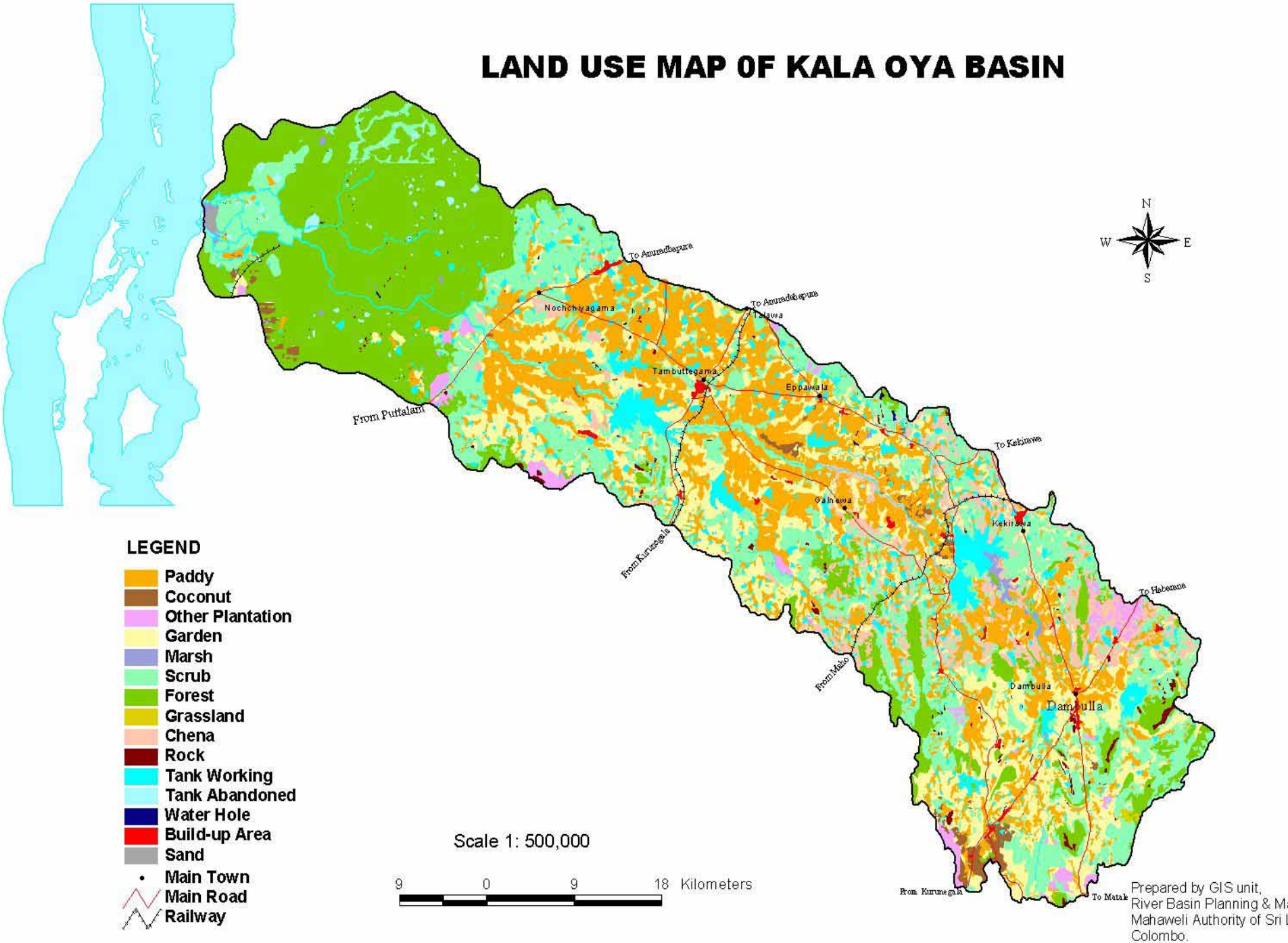
Total extent of the basin area = 2872 sq km



SUB BASINS OF KALA OYA BASIN



LAND USE MAP 0F KALA OYA BASIN



Prepared by GIS unit,
River Basin Planning & Ma
Mahaweli Authority of Sri L
Colombo.
Date : 06-02 2006

Current Status of WQ Problems

1. Human Habitat close to surface water bodies

Source: Kala Oya

Natural ponds

Irrigation Tanks

Canal network

Important Uses : Bathing

Drinking and
Other Domestic Uses

2. Irrigated Agriculture

- Salinity
- Water Infiltration Rate
- Ion Toxicity
- Excessive Nutrient

3. Fresh Water Aquatic Ecosystem

- pH
- Phosphorus Content
- COD
- DO

Reasons of WQ problems in KOB

- Major part of **KOB is covered by an irrigated agriculture Therefore, non-point source pollution is the major type of pollution in the basin.**

- **Human actions such as deforestation, cultivation and anthropogenic inputs due to urbanization & industrialization is high in upper watershed areas that feed the water to Kala Oya.**

- **Enhance dissolution of salts in irrigation water when it flows streams, reservoirs, canals ect. before it reaches the croplands. .**

- **Improper dumping of sewage & biological waste to water ways.**

Current WQ Problem in KOB

- 😐 Severe infiltration rate problems in some part of the basin would be due to high SAR value.
- 😐 Enhance dissolution of salt (conductivity) will affect the soil properties & crop growth.
- 😐 Excessive nutrient due to fertilizer application which results in high P & K.
- 😐 High Floride in some areas due to geographical variation.
- 😐 High COD and less DO will affects the aquatic ecosystem.

What Action MASL has taken so far?.....

- Carried out water quality assessment study for KOB in order to identify current problems of WQ in KOB.

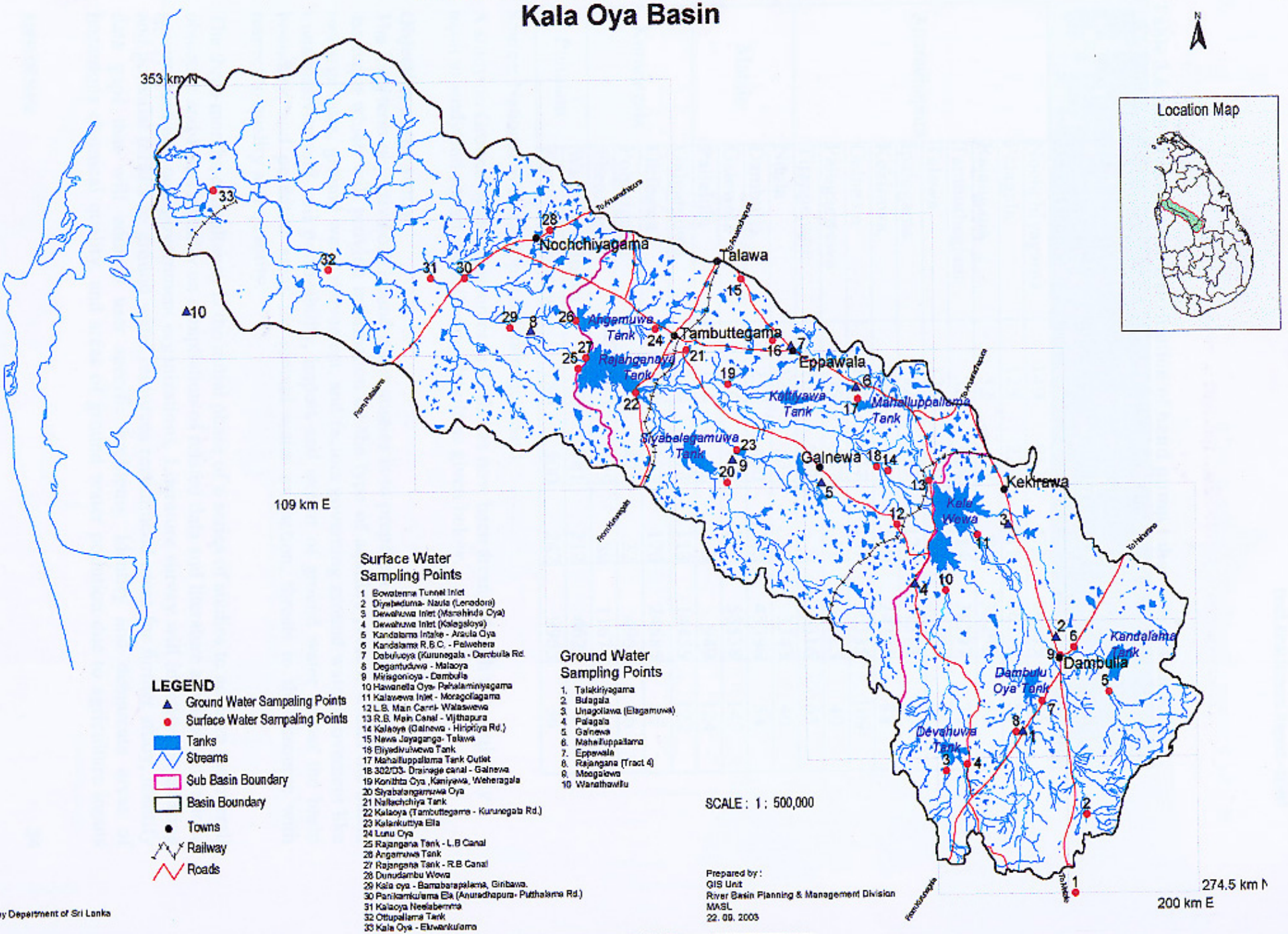
Data Sources

- WQ data from University of Colombo, Sri Lanka
- WQ measurement made by the consultants
- Field observation. It based on three type of indicators namely: biotic, aesthetic and chemical.
- Data collected at 33 sampling points

Assessments Based on :

Analysis of data that obtain form sampling station with WQ guidelines of WHO, FAO and CEA.

Water Quality Sampaling Points
Kala Oya Basin



Surface Water Sampling Points

1 Bowatenna Tunnel Inlet
2 Diyabeduma- Nauta (Lenadora)
3 Dewahuwa Inlet (Manahinda Oya)
4 Dewahuwa Inlet (Kalagaloya)
5 Kandalama Intake - Arauta Oya
6 Kandalama R.B.C. - Pelwehera
7 Dobulloya (Kurunegala - Dambulla Rd.
8 Degantuduwa - Malaoya
9 Mirisgonioya - Dambulla
10 Hawanella Oya- Pahalaminiyagama
11 Kalawewa Inlet - Moragollagama
12 L.B. Main Canal- Walaswewa
13 R.B. Main Canal - Vijithapura
14 Kalaoya (Galnewa - Hiripitiya Rd.)
15 Nawa Jayaganga- Talawa
16 Eliyadiulwewa Tank
17 Mahaliuppallama Tank Outlet
18 302/03- Drainage canal - Galnewa
19 Konithta Oya ,Kaniyawa, Weheragala
20 Siyabalangamuwa Oya
21 Nallachchiya Tank
22 Kalaoya (Tambuttegama - Kurunegala Rd.)
23 Kalankuttiya Ella
24 Lunu Oya
25 Rajangana Tank - L.B Canal
26 Angamuwa Tank
27 Rajangana Tank - R.B Canal
28 Dunudambu Wewa
29 Kala oya - Bamabarapalama, Giribawa.
30 Panikamkulama Ela (Anuradhapura- Putthalama Rd.)
31 Kalaoya Neelabemma
32 Ottupallama Tank
33 Kala Oya - Eluwankulama

Ground Water Sampling Points

1. Talakiriyagama
2. Bulagala
3. Unagollawa (Elagamuwa)
4. Palagala
5. Galnewa
6. Mahaliuppallama
7. Eppawala
8. Rajangana (Tract 4)
9. Meegalewa
10 Wanathawilu

LEGEND

- Ground Water Sampaling Points
- Surface Water Sampaling Points
- Tanks
- Streams
- Sub Basin Boundary
- Basin Boundary
- Towns
- Railway
- Roads

Analyzed WQ Parameters

- Sodium Adsorption Ratio (SAR) & Conductivity
- Turbidity
- Dissolve Oxygen (DO)
- Chemical Oxygen Demand (COD)
- pH
- Phosphorus
- Floride
- SO_4
- Nitrate
- Potassium
- Magnesium
- Alkalinity
- Calcium
- Chloride

Results of Assessment

Ambient water Quality Standard for water use Classes (CEA)

Water use Class	pH		Con	Tur	DO	COD	P	F	SAR	So_4	Cl
	Low	High									
Drinking with simple treatment	6.0	8.5		5	6	15	0.7	1.5		250	200
Bathing & recreation	6.5	9.0			5	20	0.7				
Fish & aquatic life	6.0	8.5			3	15	0.4				
Drinking with conventional treatment	6.0	9.0			4	30	0.7	1.5		250	200
Irrigation & agriculture	6.0	8.5	700		3		0.7		6-15		

Con-Conductivity (ds/m),Tur-Turbidity(NTU), pH, SAR (Numeric value), Others (ppm)

Number of Violation of Ambient WQ Parameters in KOB.

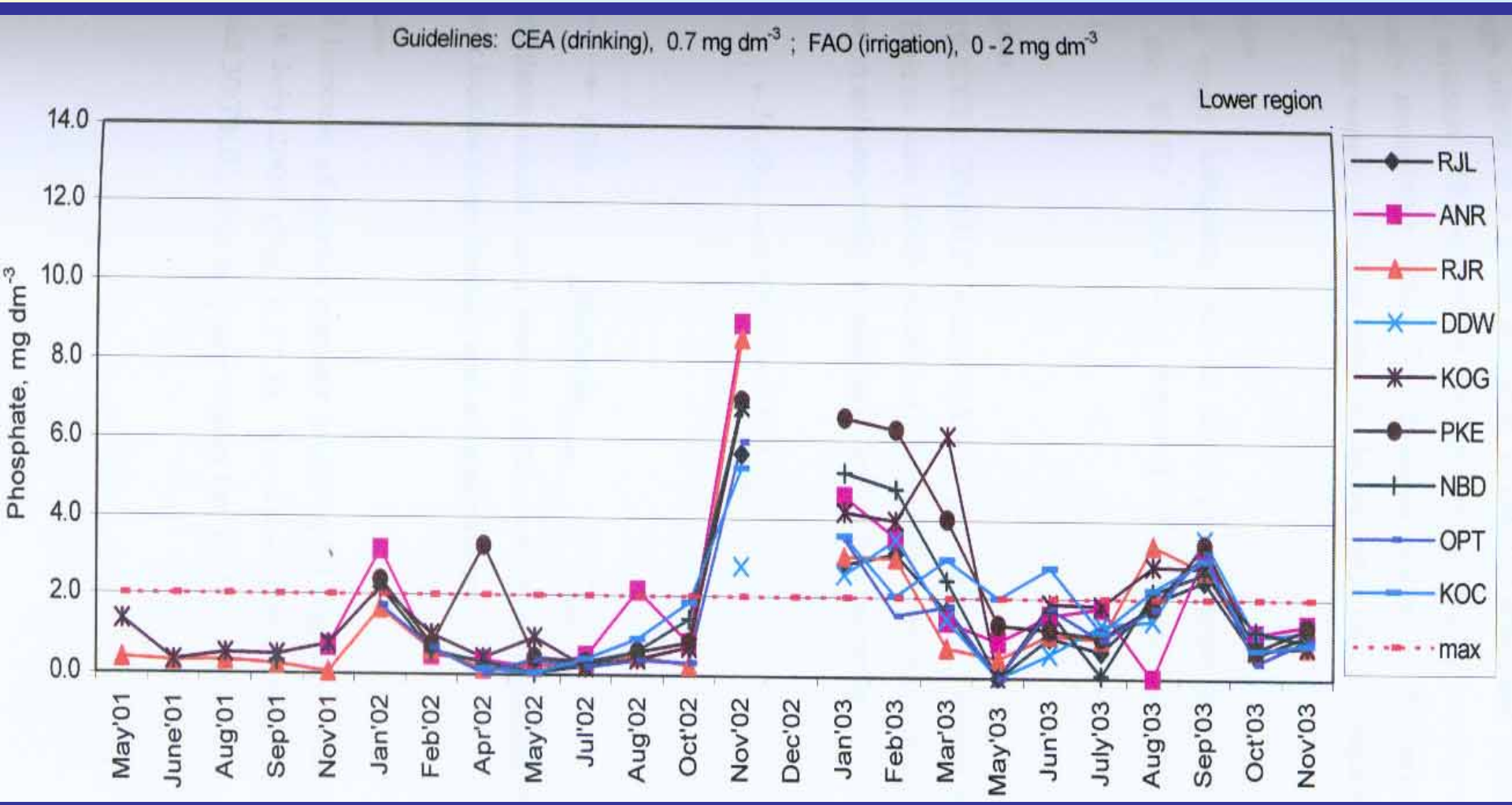
Water Use Class	Basin Location	Water Quality Parameter							
		DO	COD	pH(L)	pH(H)	So_4	Tur	P	F
Drinking with simple treatment	Upper	32	38	0	9	0	94	37	0
	Middle	53	75	0	34	0	115	59	13
	Lower	54	69	0	27	0	73	42	1
Bathing	Upper	16	28	0	0			37	
	Middle	28	49	0	11			59	
	Lower	29	44	0	8			42	
Drinking with conventional treatment	Upper	9	8	0	1			37	0
	Middle	17	14	0	12			59	13
	Lower	15	14	0	8			42	1

SAR and Conductivity Based on Sampling Point

SAR	Sampling Station			
	C<0.2	.2<C<.3	.3<C<.5	.5<C<.7
0 - 3	03 Station			
3 - 6		5 Station	17 Station	2 Station
6 - 12			1 Station	2 Station

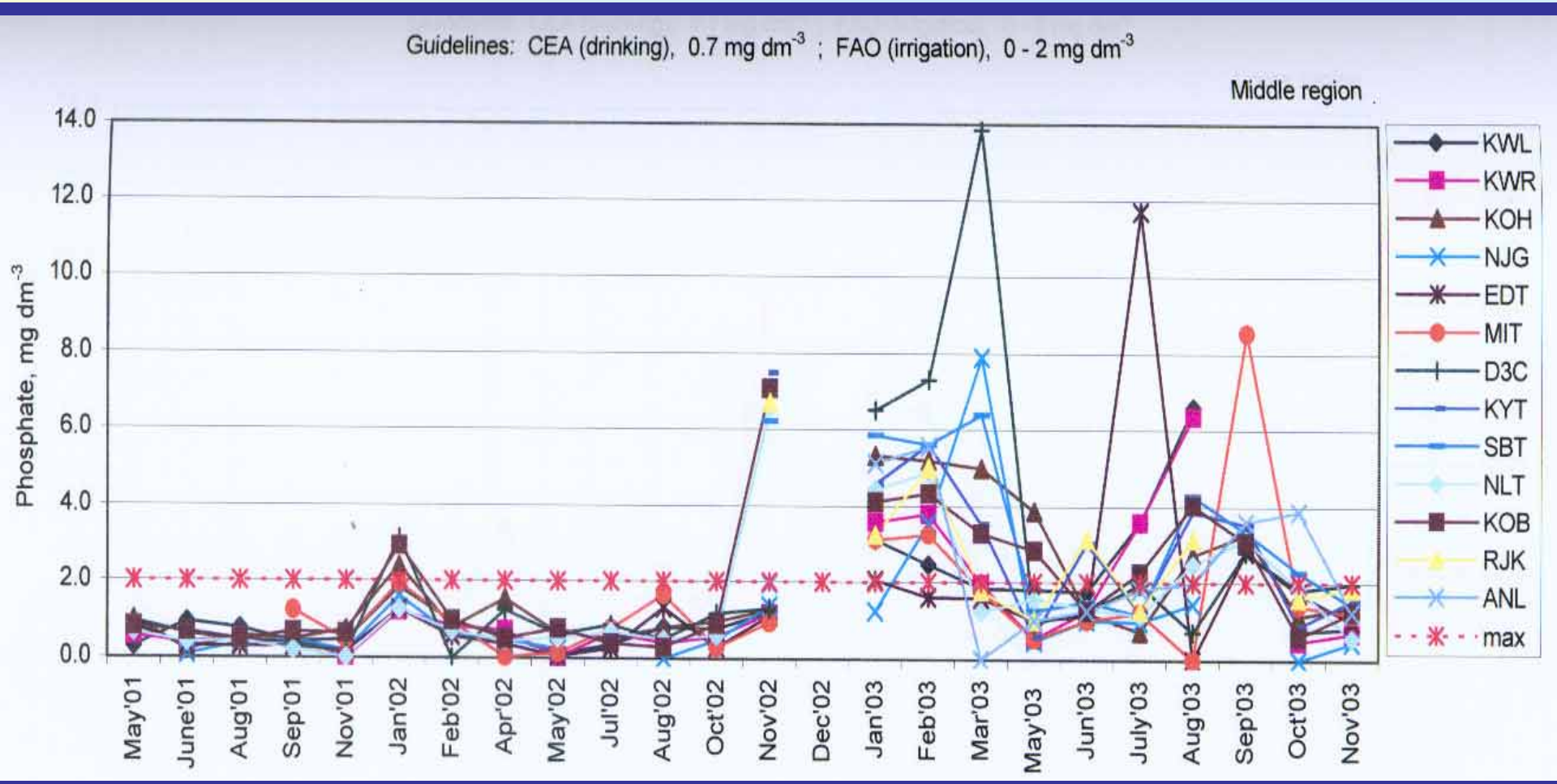
Seasonal Variation of Phosphorus

Lower Basin



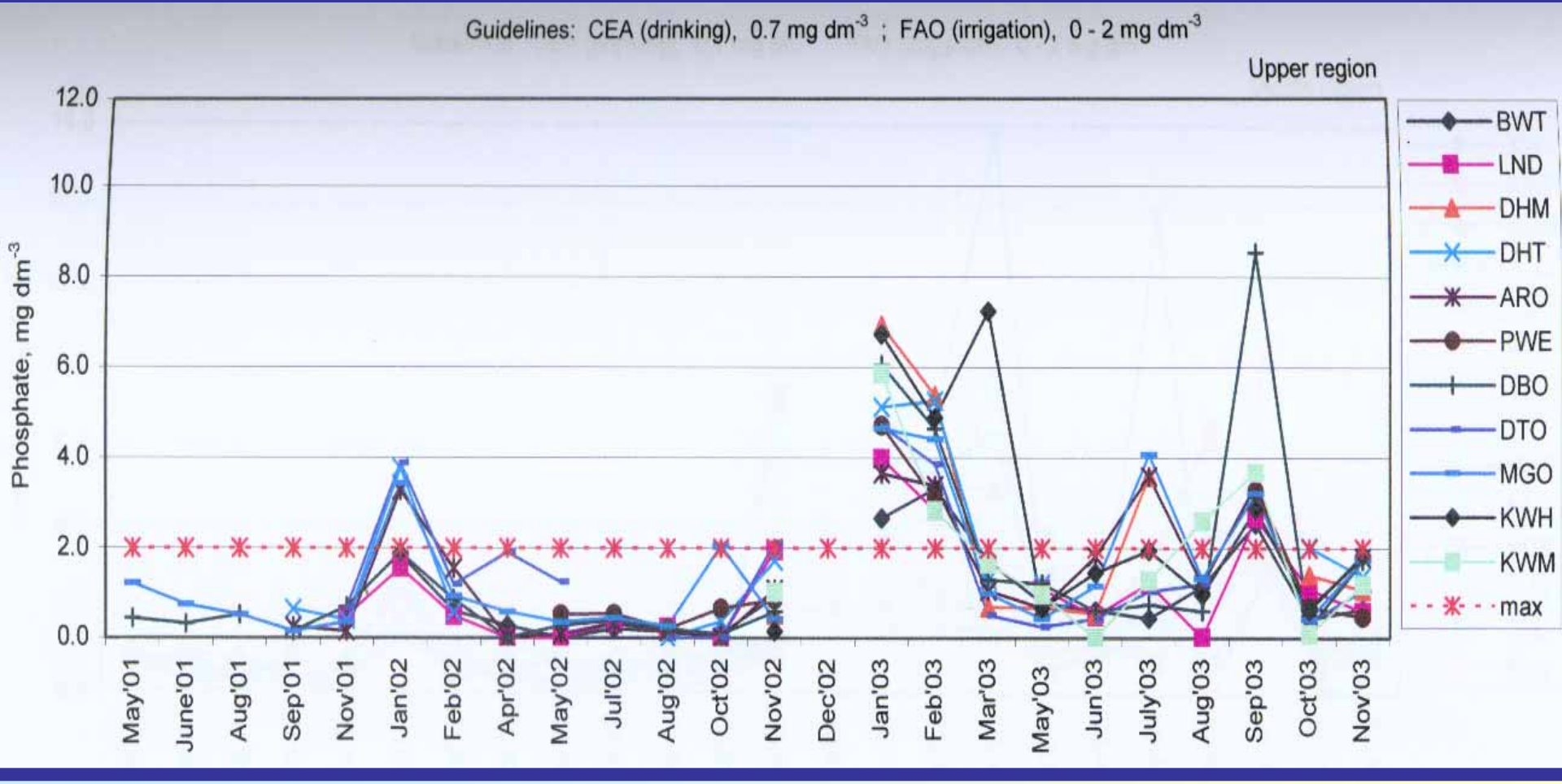
Seasonal Variation of Phosphorus

Middle Basin



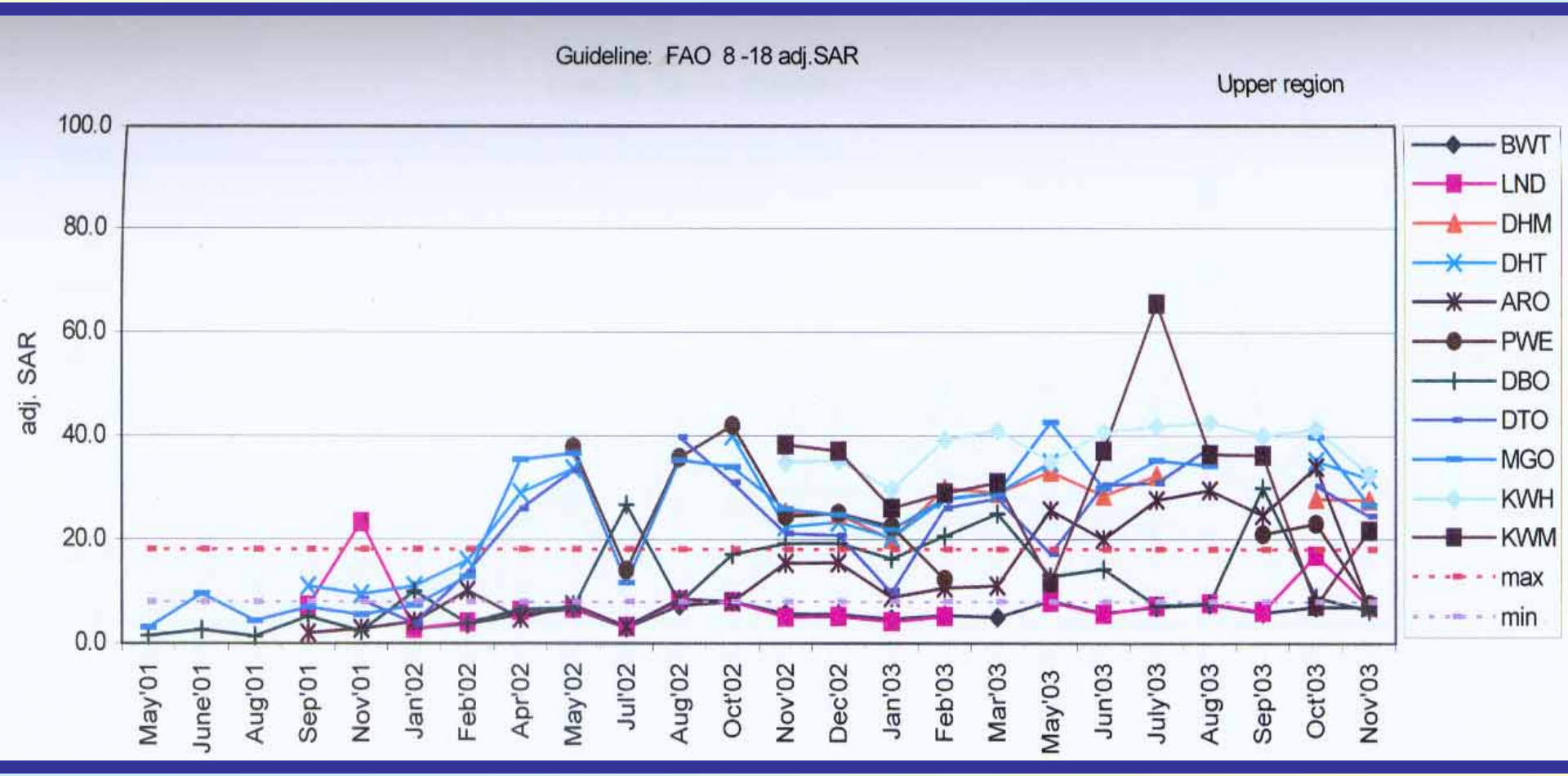
Seasonal Variation of Phosphorus

Upper Basin



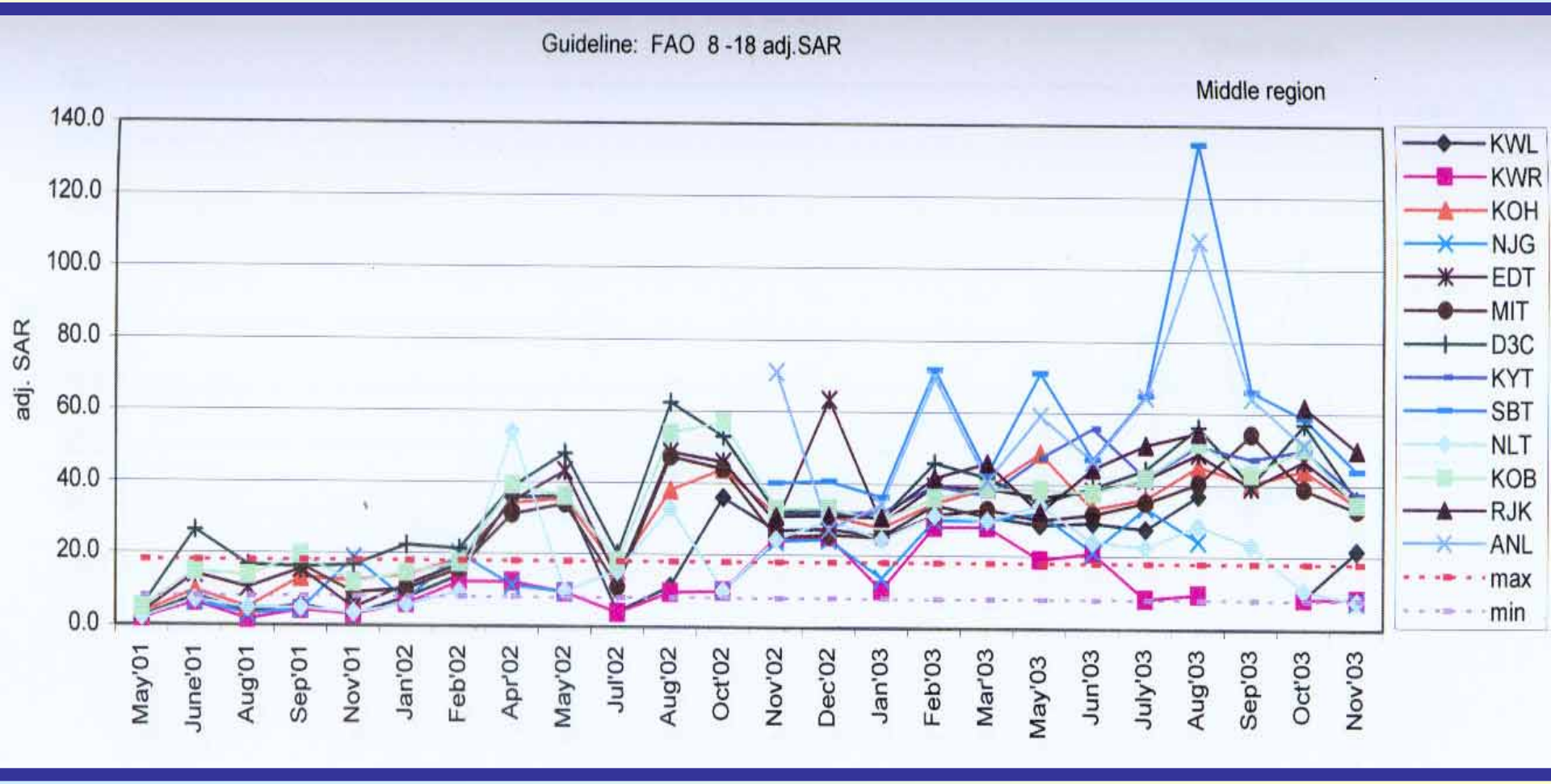
Seasonal Variation of adj. SAR (ESP)

Upper Basin



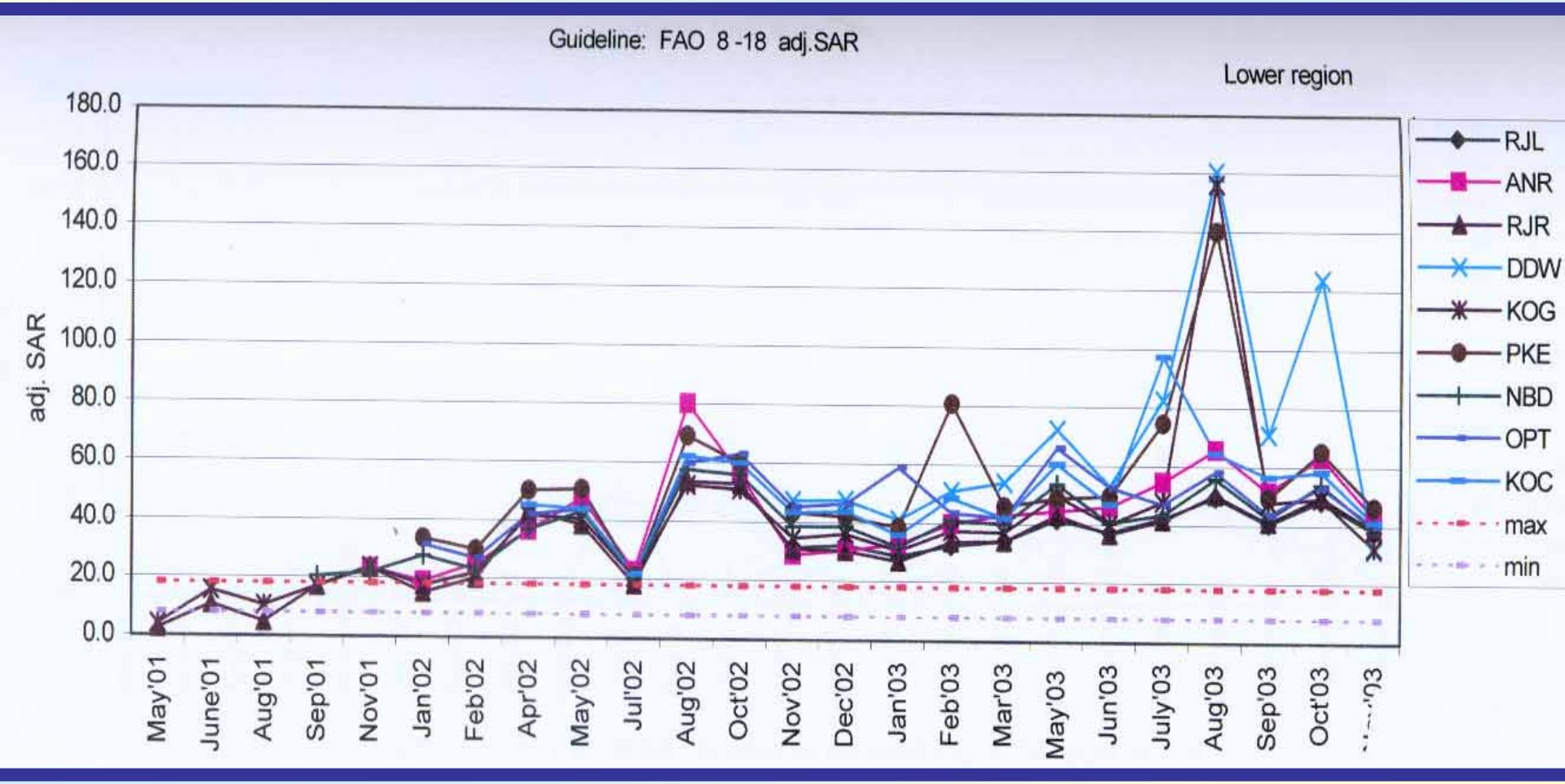
Seasonal Variation of adj. SRA (ESP)

Middle Basin



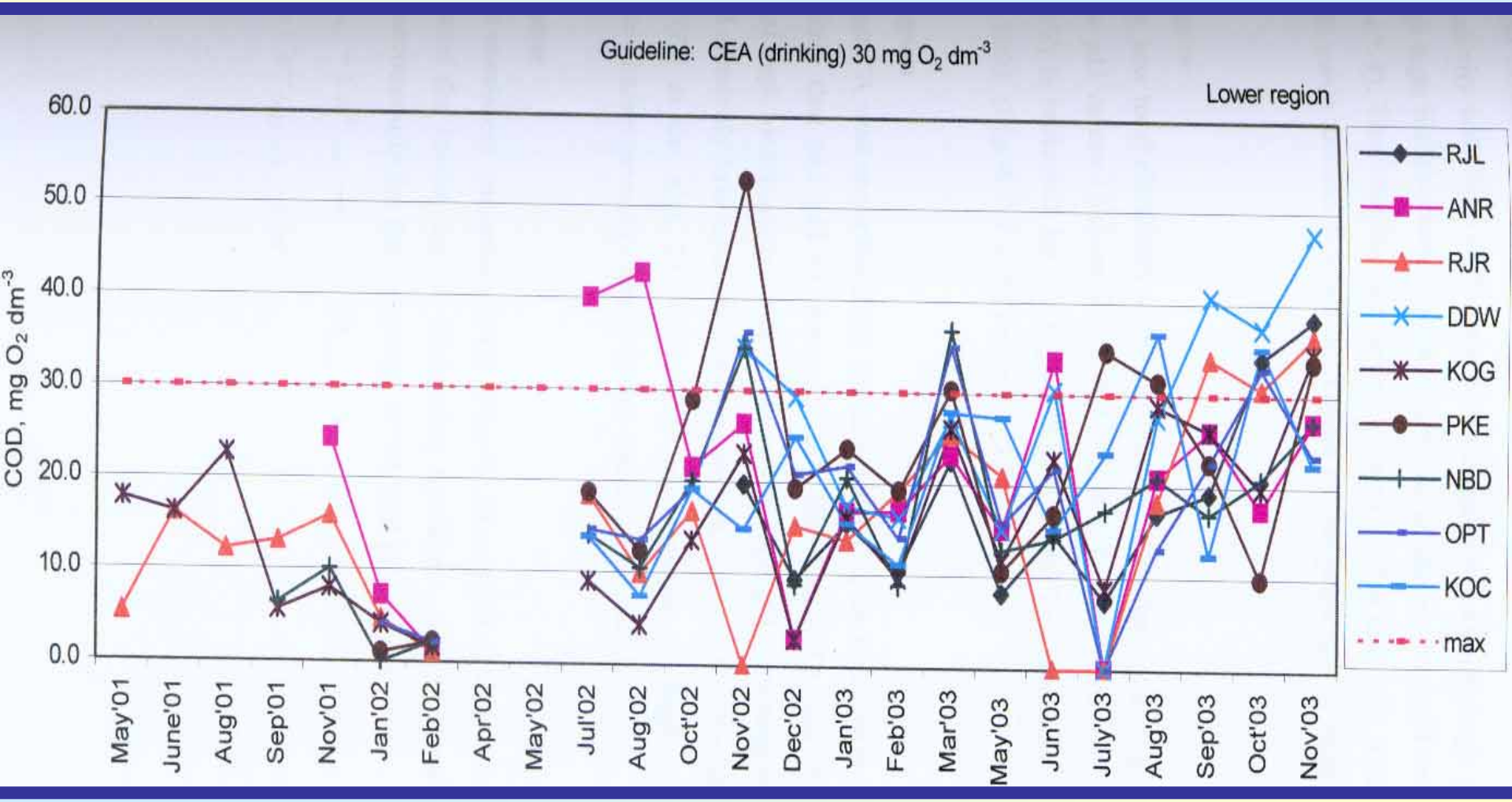
Seasonal Variation of adj. SRA (ESP)

Lower Basin



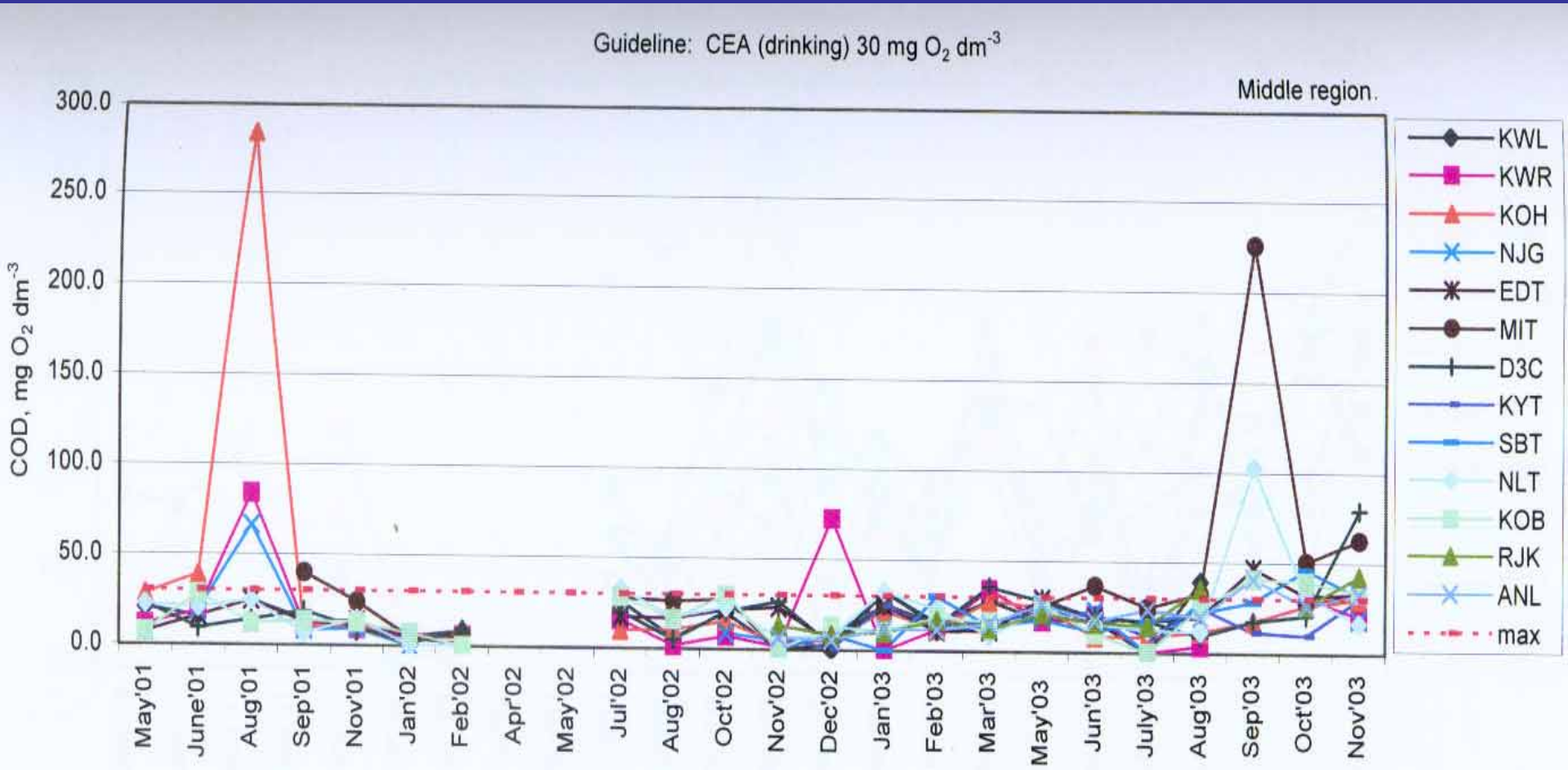
Seasonal Variation of COD

Lower Basin



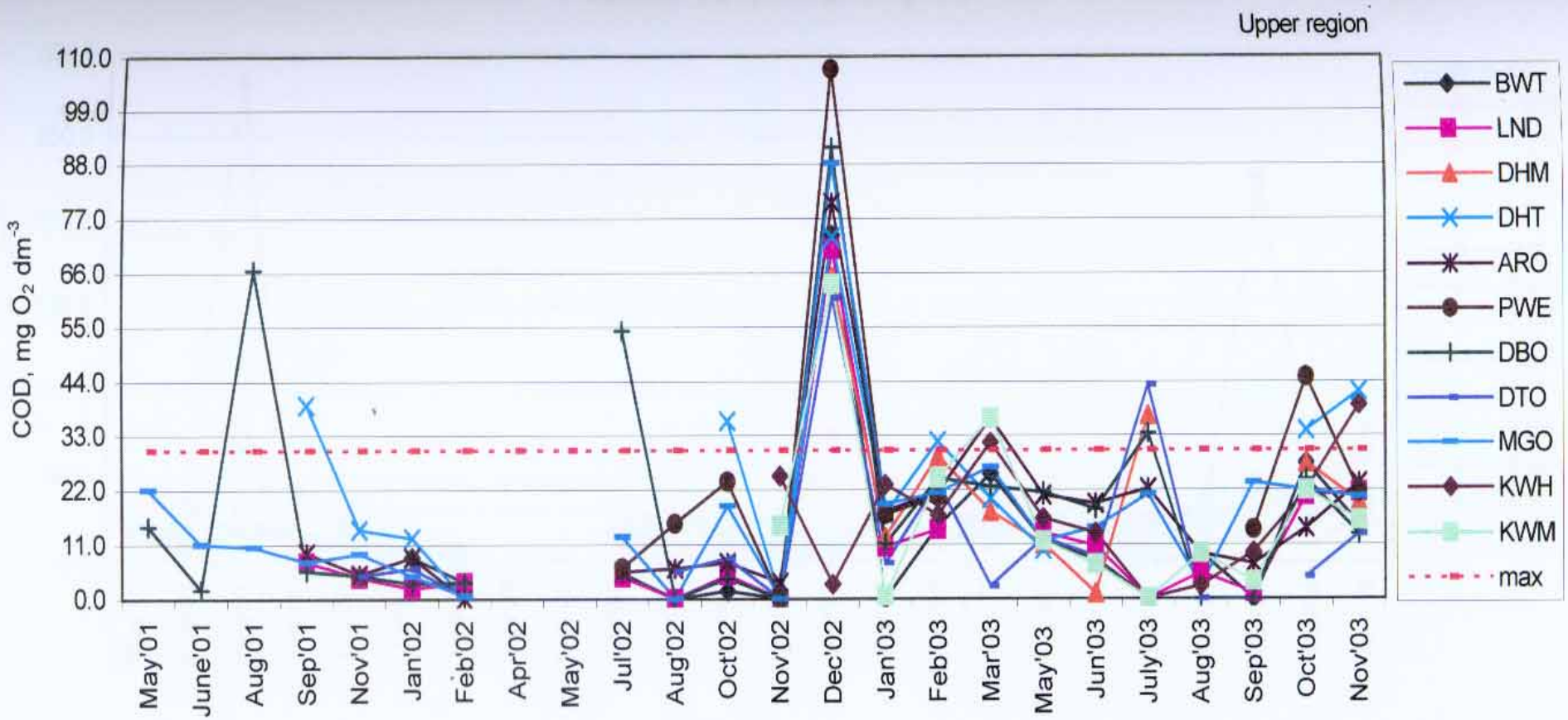
Seasonal Variation of COD

Middle Basin



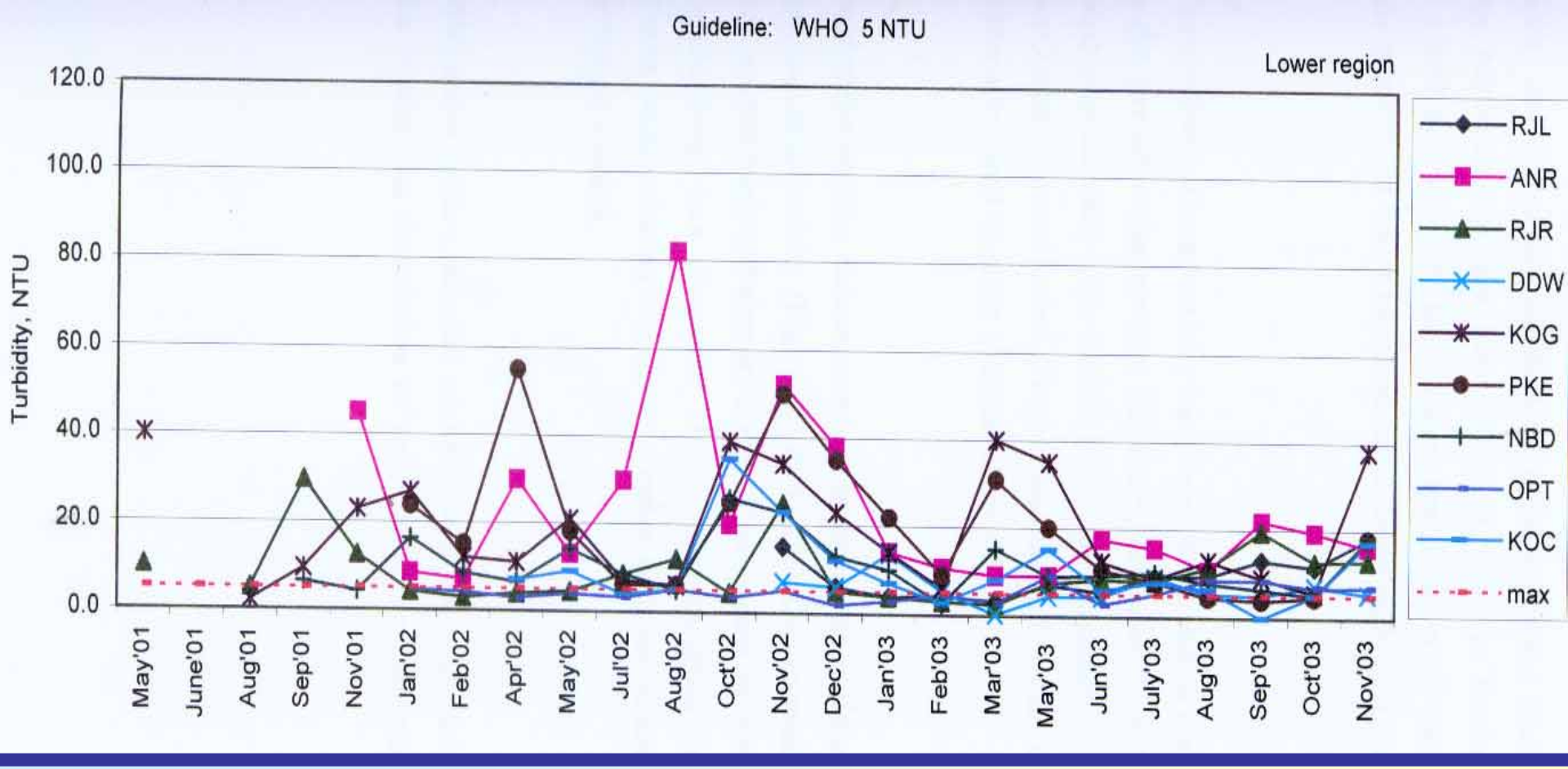
Seasonal Variation of COD

Upper Basin



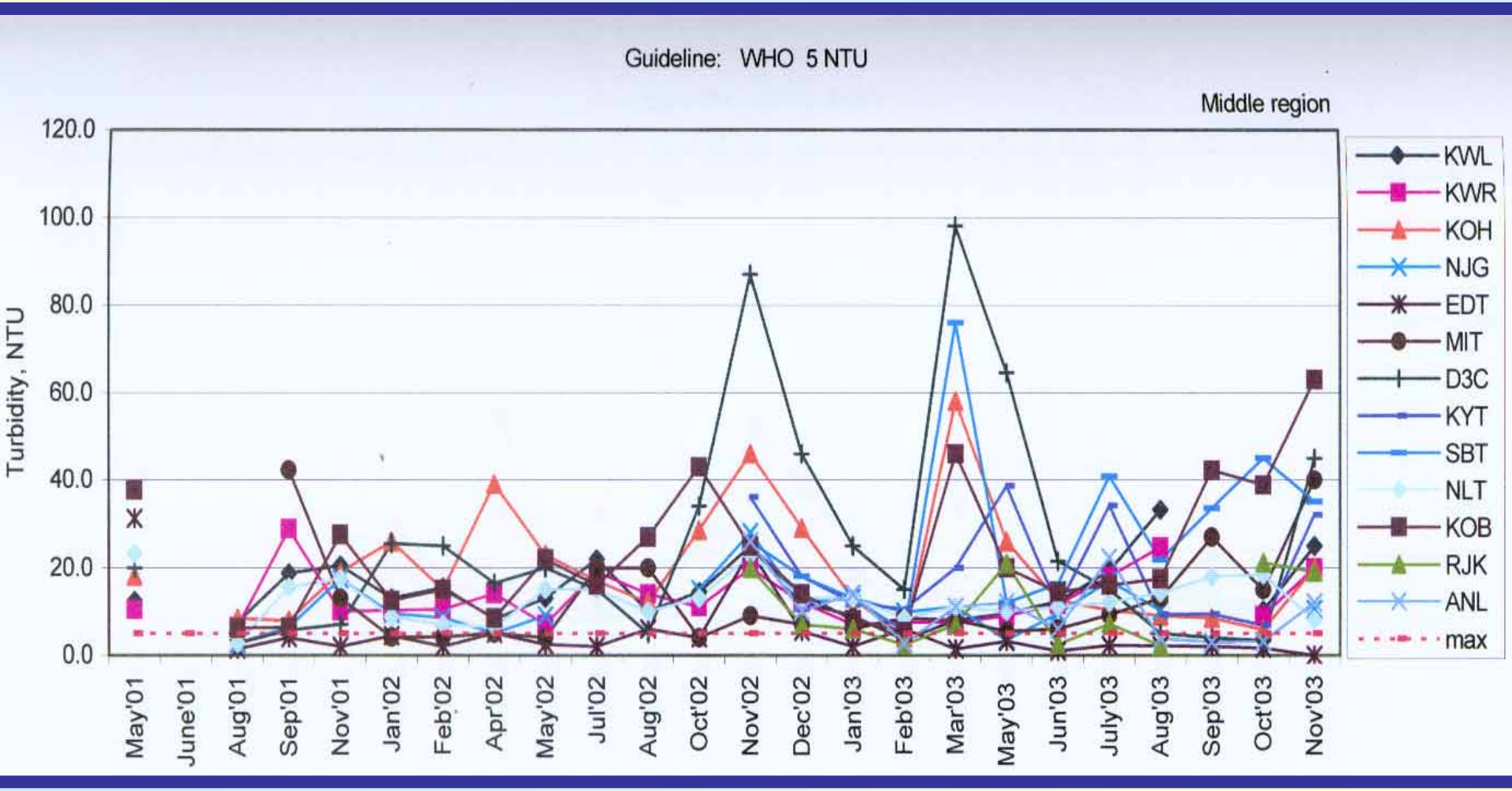
Seasonal Variation of Turbidity

Lower Basin



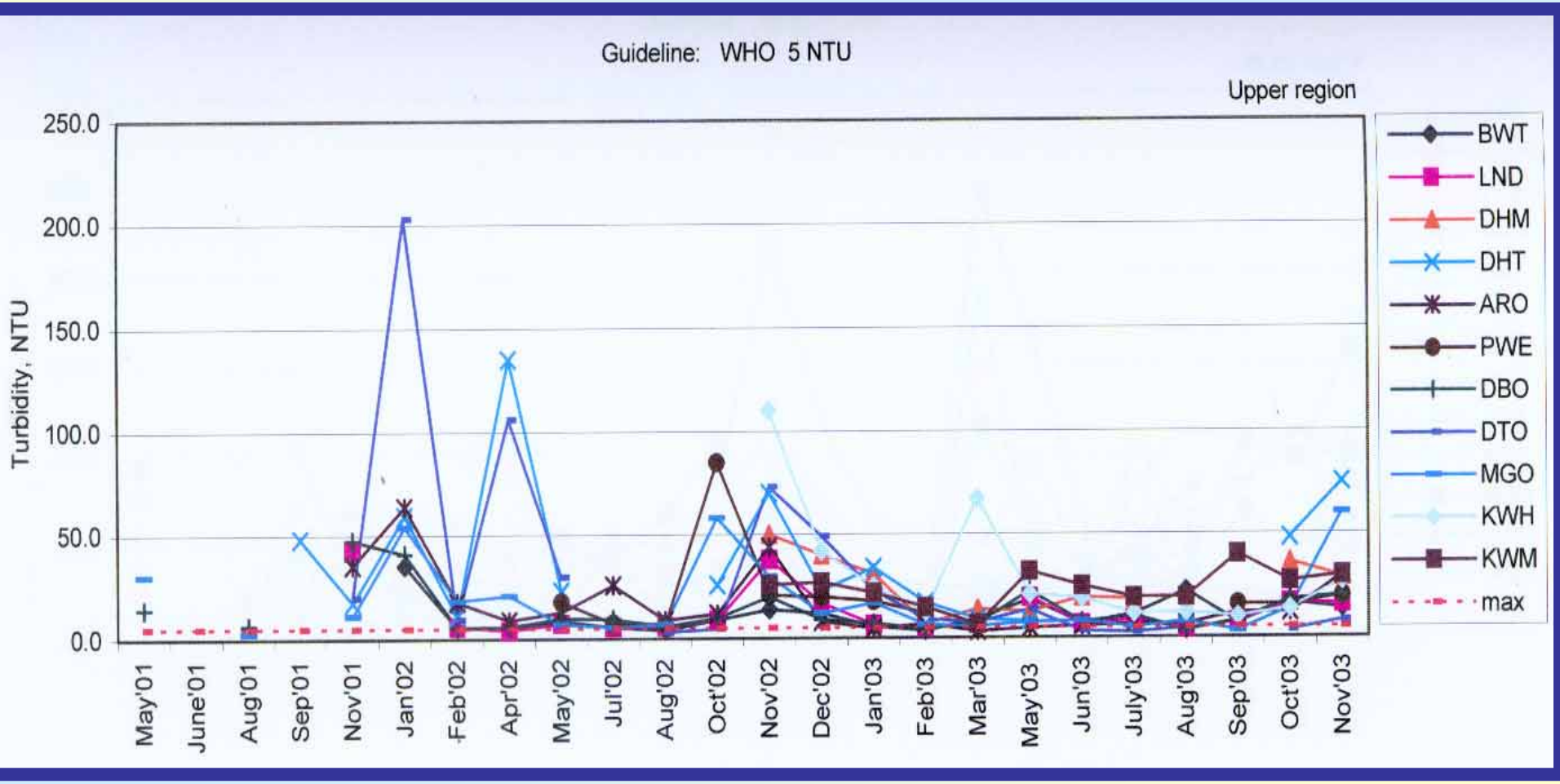
Seasonal Variation of Turbidity

Middle Basin



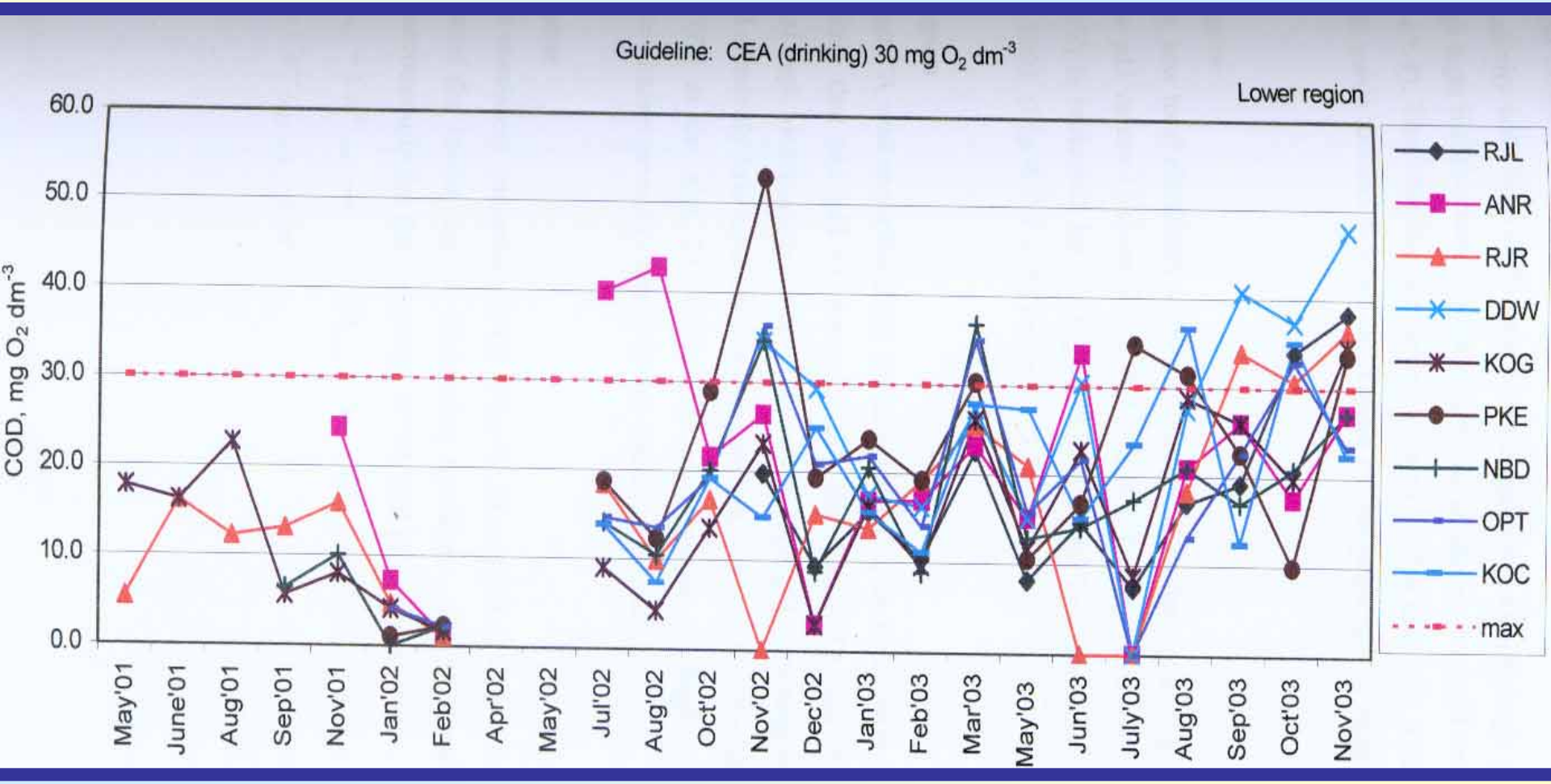
Seasonal Variation of Turbidity

Upper Basin



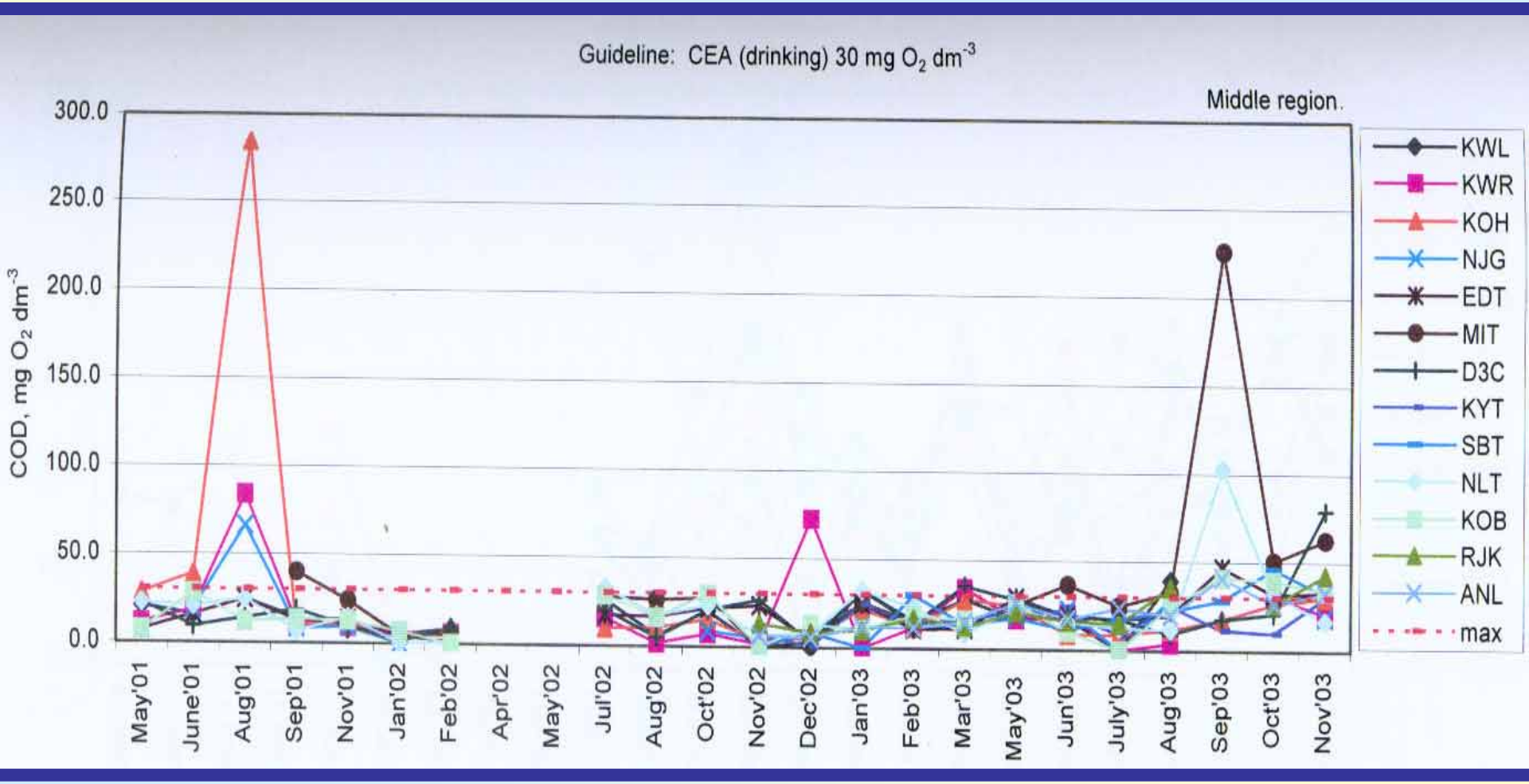
Seasonal Variation of Conductivity

Lower Basin



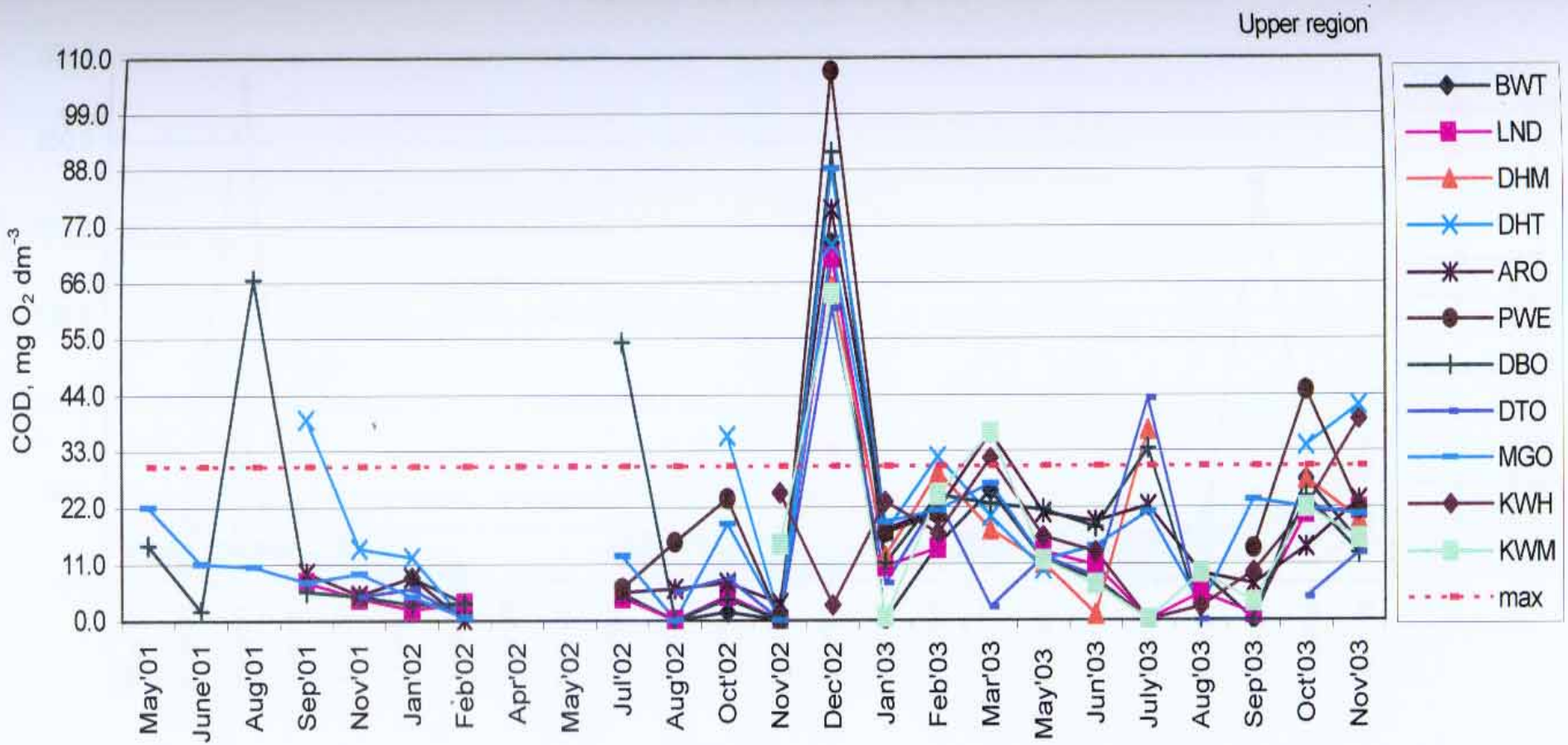
Seasonal Variation of Conductivity

Middle Basin



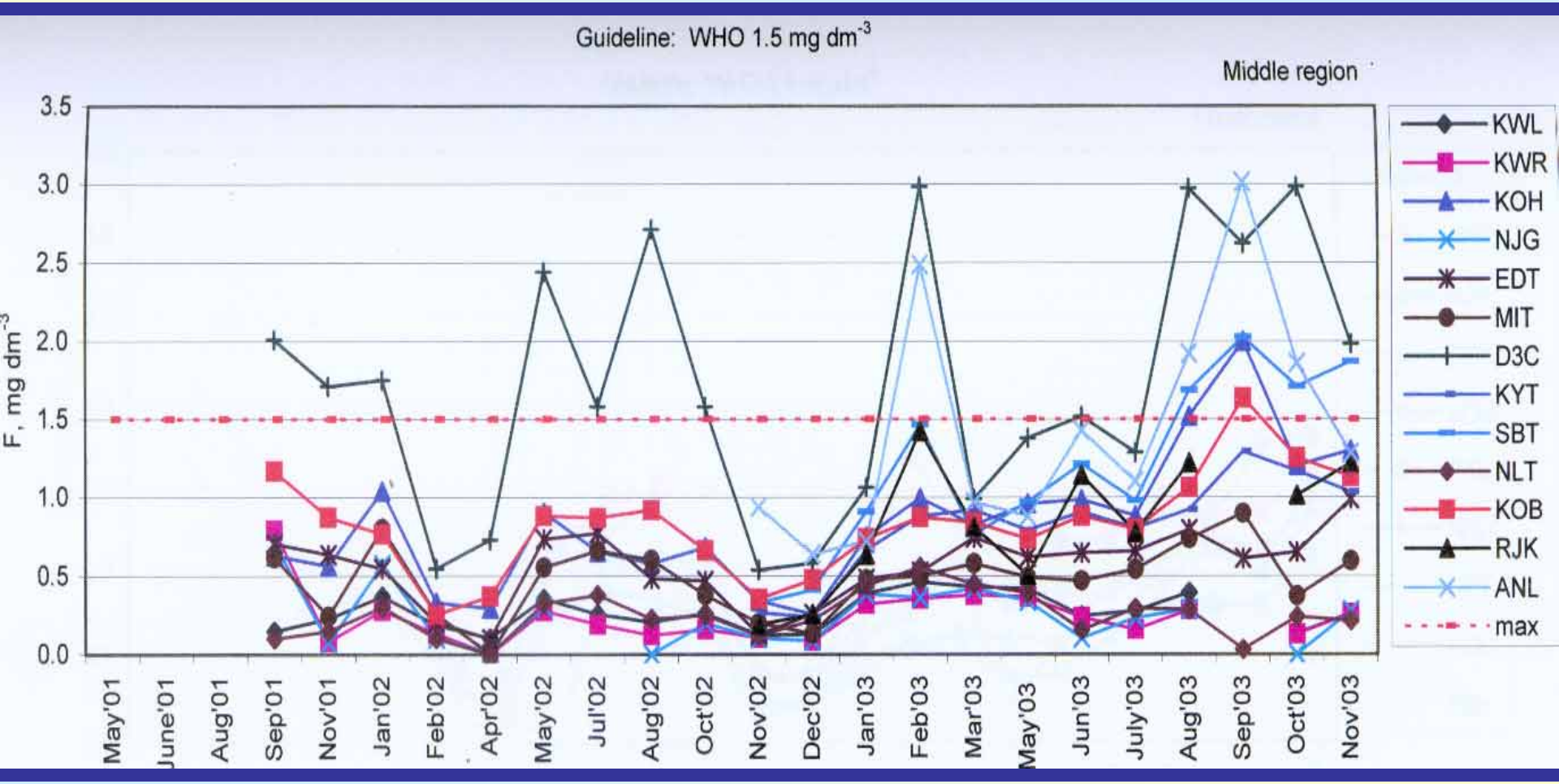
Seasonal Variation of Conductivity

Upper Basin



Seasonal Variation of Floride

Middle Basin



Observations

- The excessive level of P in drinking & irrigation water in three sub basin are the major WQ problem in KOB . Significantly high levels are shown in middle & lower basin.
- There is a tendency of increasing SAR & conductivity value in the middle and more prominent in lower basin.
- COD is some what violated while DO violation is less. The result show rapid deterioration of WQ in middle basin.

Cont:

- Turbidity values are quite high in dinking water specially in middle basin. High values are associated with heavy rain.

- Floride content is not a problem in surface water but it affect on ground water. This is not wide spared in the basin but limited to small geographical area in middle basin.

- pH valued showed is acceptable in through out the basin except few cases due to point source pollution.

Adverse impact on Water Quality

- High P content of surface water leads to algal blooms in tank. The algal blooms are affected to water supply and other beneficial users of surface water. Even chronic health problem may be possible due to high P level.

- High Conductivity and SAR value affect water infiltration rate and soil characteristics. Thereby, it reduce crop growth and crop production.
- High COD & P level also affect the aquatic life.

- High turbidity affect the drinking water.
- High floride would result dental problem.

What we will do for minimizing the WQ problem?

- Plan & implement proper Environmental Management Program.
- Conservation of Riparian Zones & Floodplains (healthy riparian zone can be remove 85% of N & 90% of sediments and trapped 50% of P).
- Conduct Awareness Programmes stakeholders to minimize Human interventions.
- Design & implement economically feasible waste management plan covering the whole basin.

Conclusion

Proper Environment Planning and Management
is a must for the sustainability
any
kind of development .


Keep Water always Clean with Good Quality
Thank you for your Attention