

THE MEXICAN ENVIRONMENTAL FLOW STANDARD (SCOPING AND APPLICATIONS)

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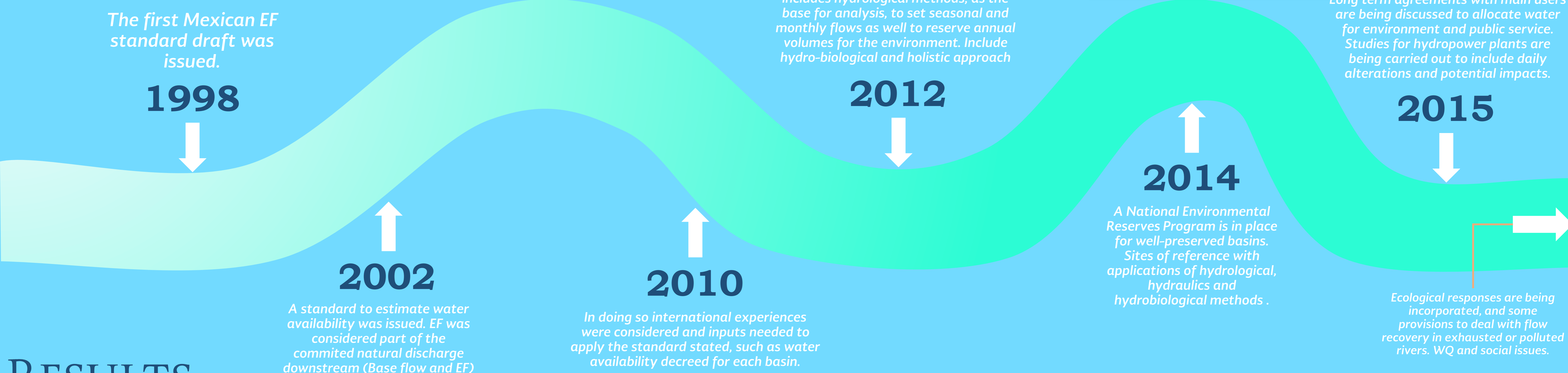
OBJECTIVE

The NMX-AA-159-SCFI-2012 Standard establishes the procedure and technical specifications to determine the ecological flow regime in current or national water bodies in river basins.

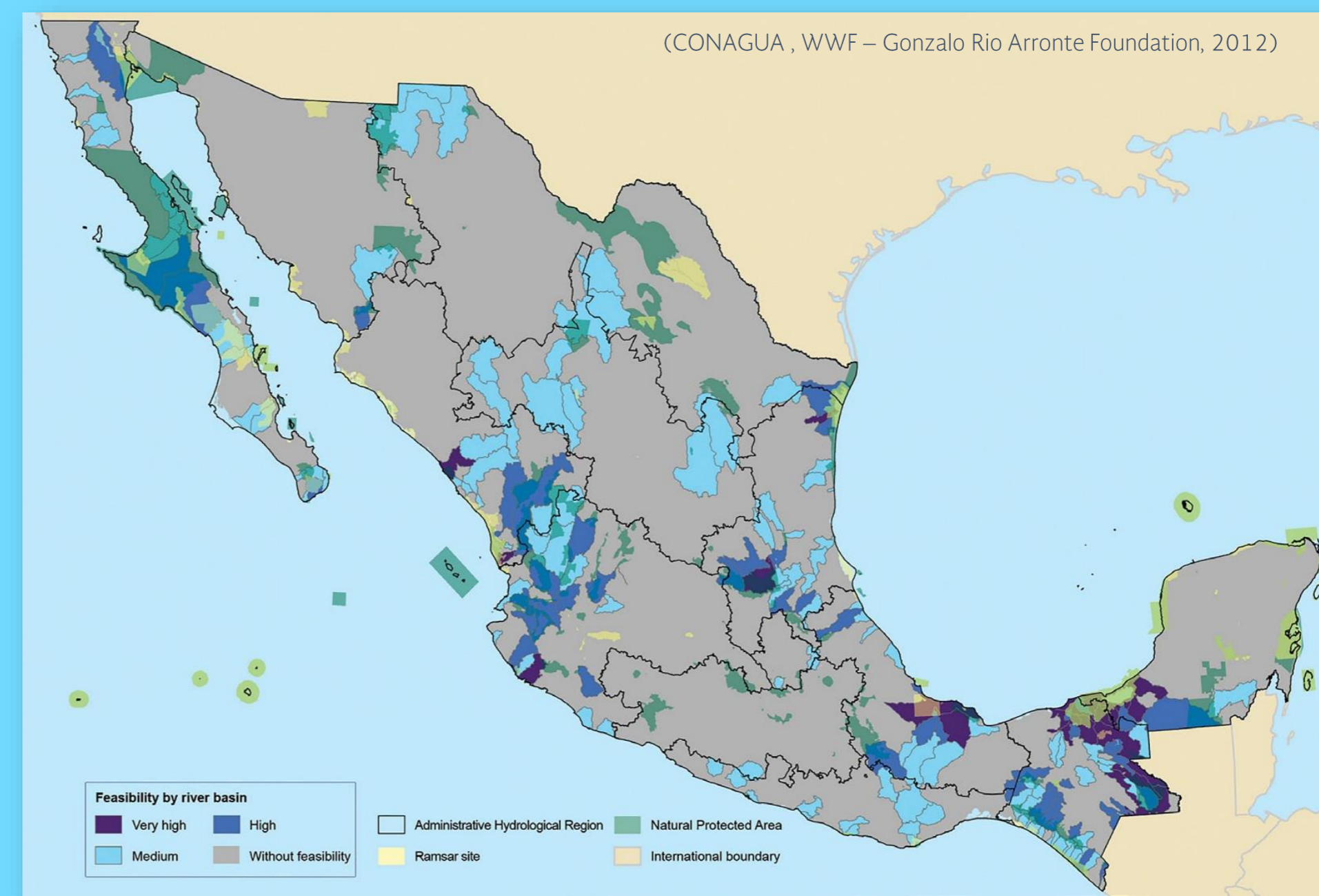
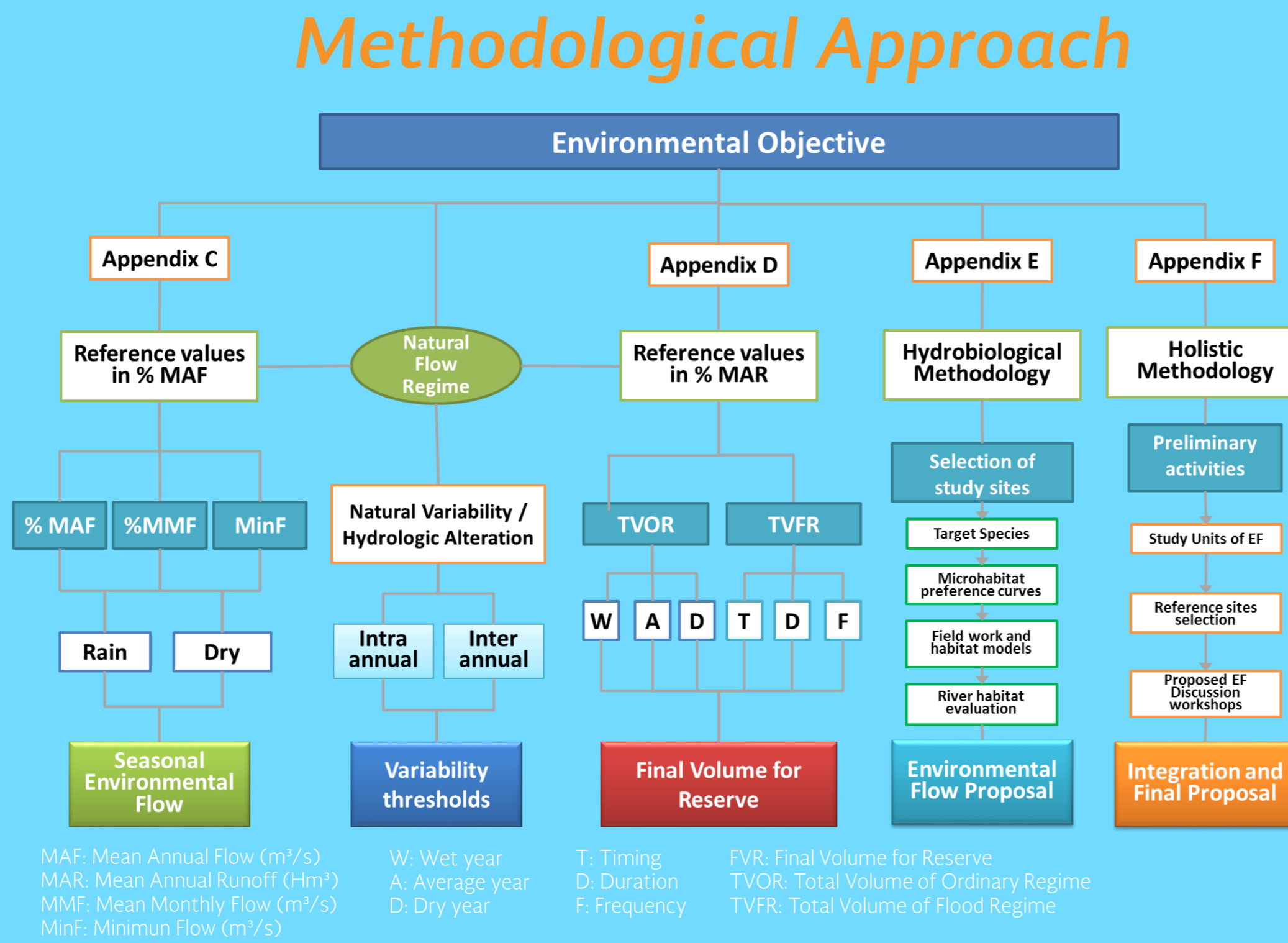
APPLICATIONS

Applies to all those who conduct studies to request allocations, build infrastructure, make inter-basin transferences, or similar to Environmental Impact Assessment (EIA). As well for all streams or water bodies whose water availability agreements published in the Mexican Official Journal (DOF), do not consider a flow for the conservation of aquatic ecosystems.

DEVELOPMENT



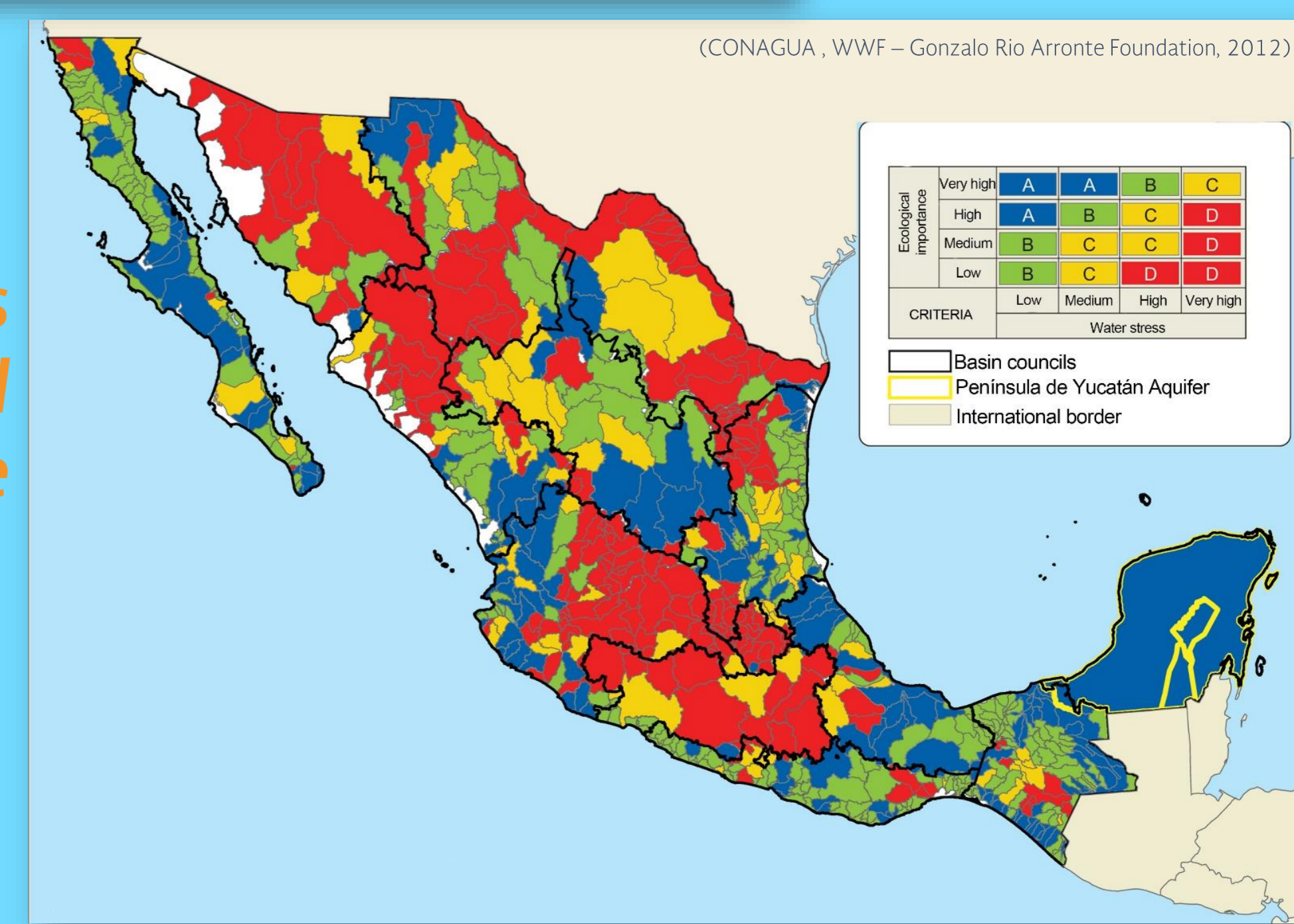
METHODS



Potential Water Reserves

This program will constitute an early adaptation measure focusing on saving water for the environment and future generations, and coincides with the urgent need for society to preserve its natural heritage and promote water management focused on saving and securing the watershed balance – which form the strategic objective of the Federal Government's 'Water Agenda 2030'.

Basins Environmental Objective



RESULTS

Basin Water Availability

Official Mexican Standard

"Conservation of water resources - it establishes the specifications and the method to determine mean annual availability of national waters."

ANNUAL MEAN SURFACE WATER AVAILABILITY IN A WATERSHED.

It is determined into the mainstream at the exit of the watershed, by following expression:

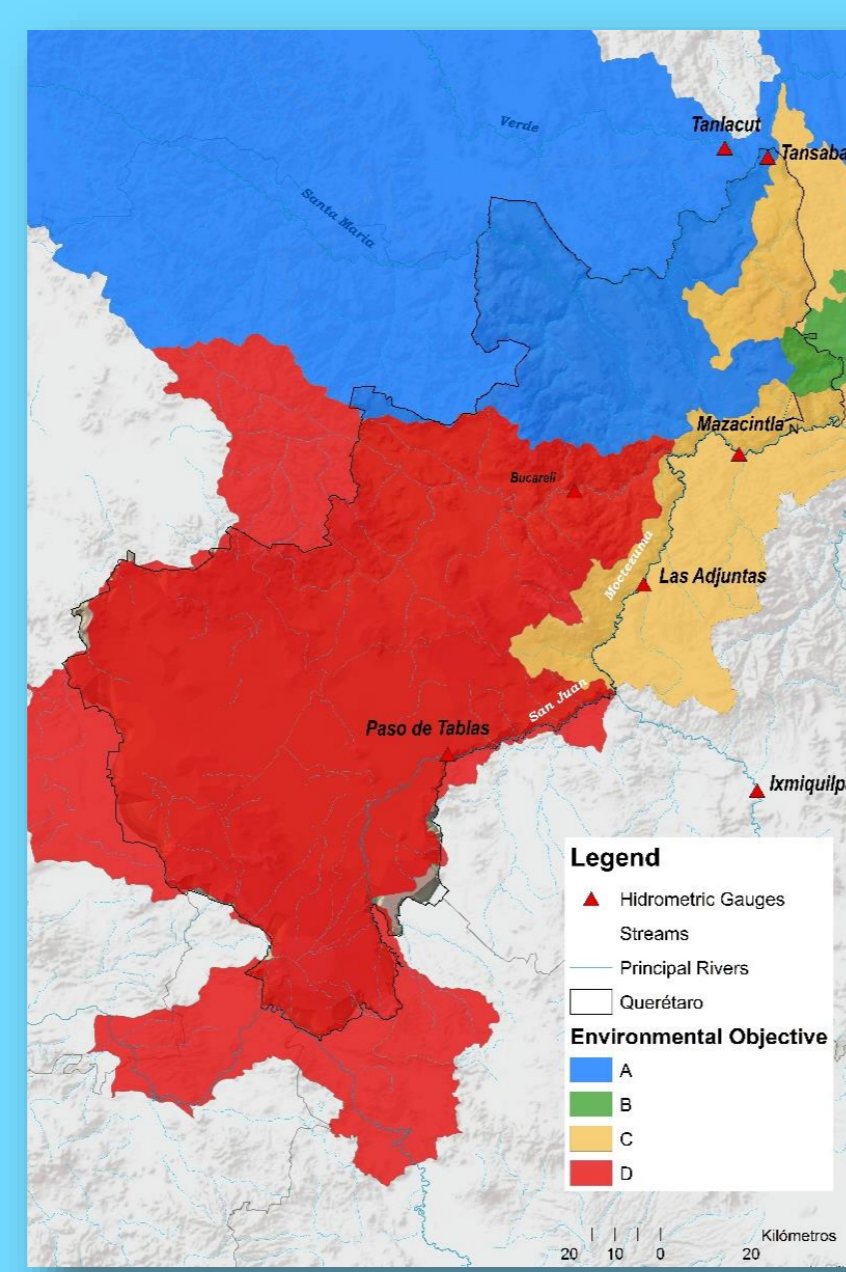
$$\text{ANNUAL AVERAGE AVAILABILITY OF SURFACE WATER IN THE BASIN} = \text{AVERAGE ANNUAL VOLUME DRAINAGE BASIN TO DOWNSTREAM} - \text{CURRENT ANNUAL VOLUME COMMITTED DOWNSTREAM}$$

ANNUAL AVERAGE AVAILABILITY OF GROUNDWATER IN AN AQUIFER.

It is determined by following expression:

$$\text{ANNUAL AVERAGE AVAILABILITY OF UNDERGROUND WATER IN AN AQUIFER} = \text{AVERAGE ANNUAL TOTAL RECHARGE} - \text{COMMITTED NATURAL DISCHARGE} - \text{GROUNDWATER EXTRACTION}$$

Public use Stream Classification

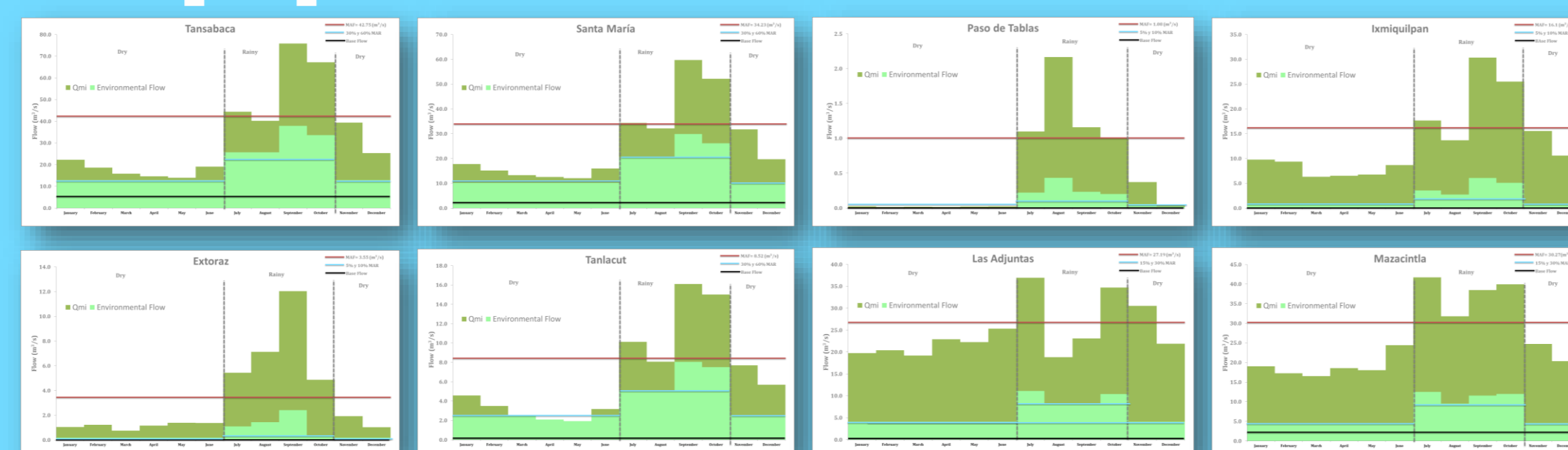


Site	Stream	State	Env. Obj.
Paso de Tablas	Río San Juan	Querétaro	D
Ixmiquilpan	Río Tula	Hidalgo	D
Las Adjuntas	Río Moctezuma	Querétaro	C
Mazacintla	Río Moctezuma	Querétaro	C
Tanlacut	Río Verde	San Luis Potosí	A
Tansabaca	Río Tampoán	San Luis Potosí	A
Santa María	Río Santa María	San Luis Potosí	A
Extóraz	Río Extóraz	Querétaro	D

Water allocation for public use

Stream/Section	Environmental Objective	Availability 2011	Mexican Standard Threshold	Reserve for Public Use 2013	Year
Moctezuma 1	C	627.43	15-24%	158 (25%)	2021
Extoraz	D	98.94	5-14%	79 (80%) Qto, 15.18 (14%) Qto.	2060
Santa María 3	A	409.93	>= 40%	158 (38%) Qto, 139 (33%) Qto.	2080

Environmental flow proposal



Water reserves

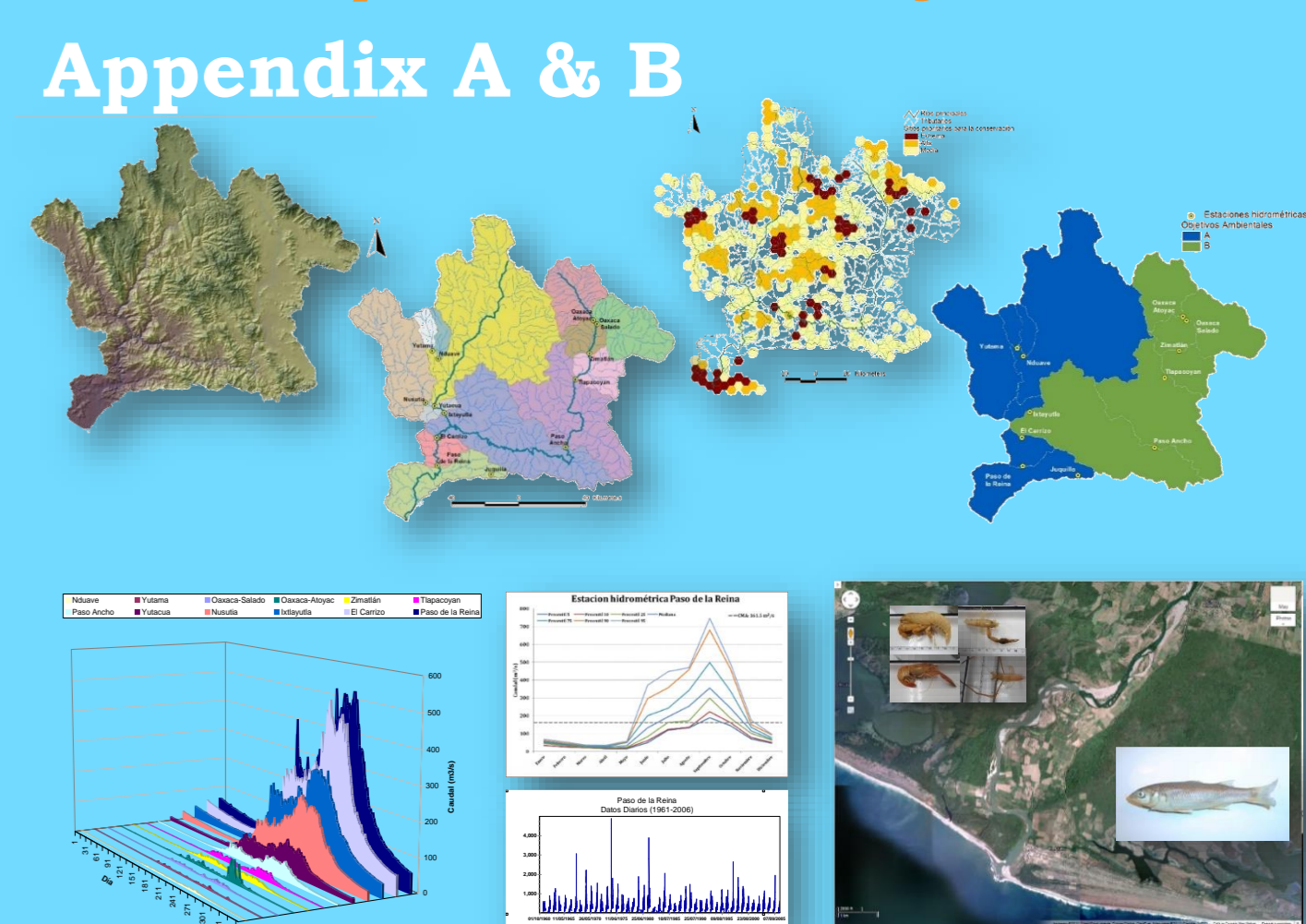
Mexican "DECREE whereby the agreements listed are abrogated and is established the water reserves for watersheds appointed."

9th Article

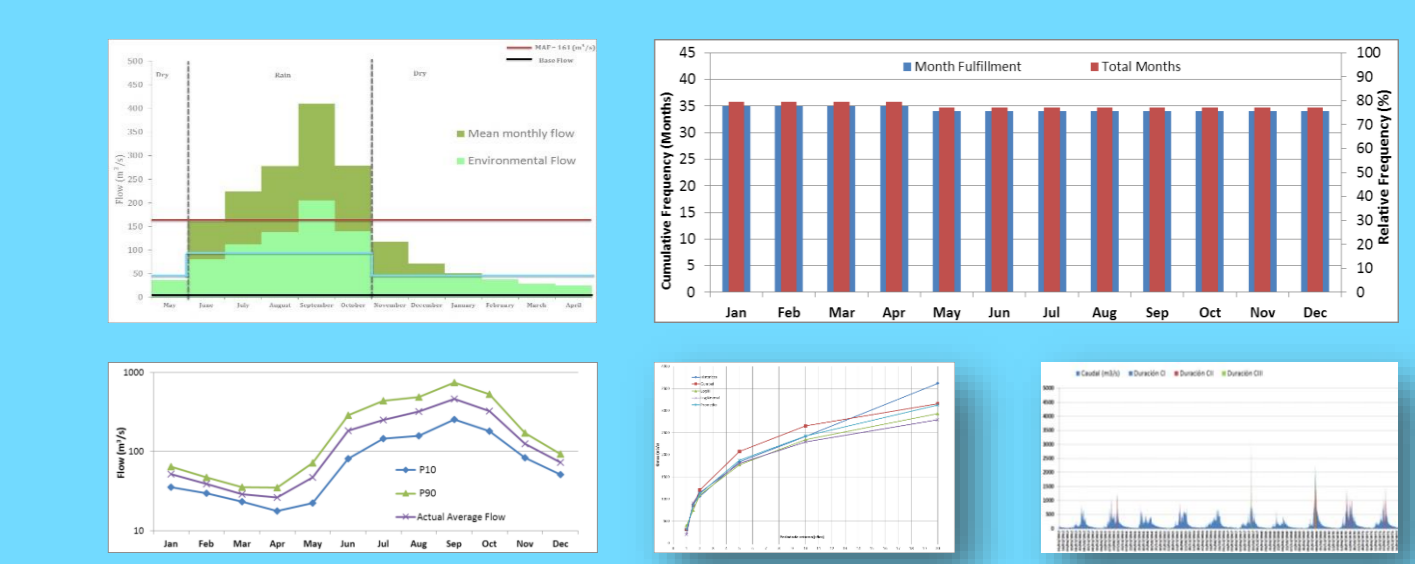
"The bases and provisions to be taken by the National Water Commission for granting concessions national reserve of surface water for environmental use or ecological conservation are:"

San Pedro Mezquital River: 354.74 Hm³
 San Pedro Desembocadura: 2,296.66 Hm³

Hydraulic Projects



Appendix C & D



$$\text{FVR} = \text{TVOR} + \text{TVFR}$$

$$\text{FVR} = 3,320 + 198 = 3,518 \text{ Hm}^3/\text{year}$$

$$\text{FVR} = 3,518 \text{ Hm}^3/\text{year} = 64\% \text{ of the MAR (5,430 Hm}^3/\text{year)}$$

Reservoir Fill

Months	Historic Monthly Contribution (Hm ³ /year: 1972-2011)	Flow and volume Adjusted data (Hm ³ /year)
January	83.77	10.71
February	84.02	11.27
March	96.38	17.94
April	105.46	18.23
May	335.59	1.28
June	409.69	16.43
July	416.45	15.84
August	483.19	17.94
September	1352.44	57.94
October	529.5	204.22
November	277.71	105.4
December		27.71
Total	5134.71	343.46

% of Mean Annual Volume: 63.18

CONCLUSIONS

1. Importance of counting with a reference standard with a definition of flow regime instead minimal flow.
2. Advances on environmental reserves decreed at country level.
3. Increasing case studies with different methodologies.
4. Moving towards multidisciplinary approach for ecosystem responses.
5. Advances on monitoring and follow up protocols.
6. Participation at Latin American level through IHP-UNESCO Ecohidrology (March 2015 last meeting in Panama).

