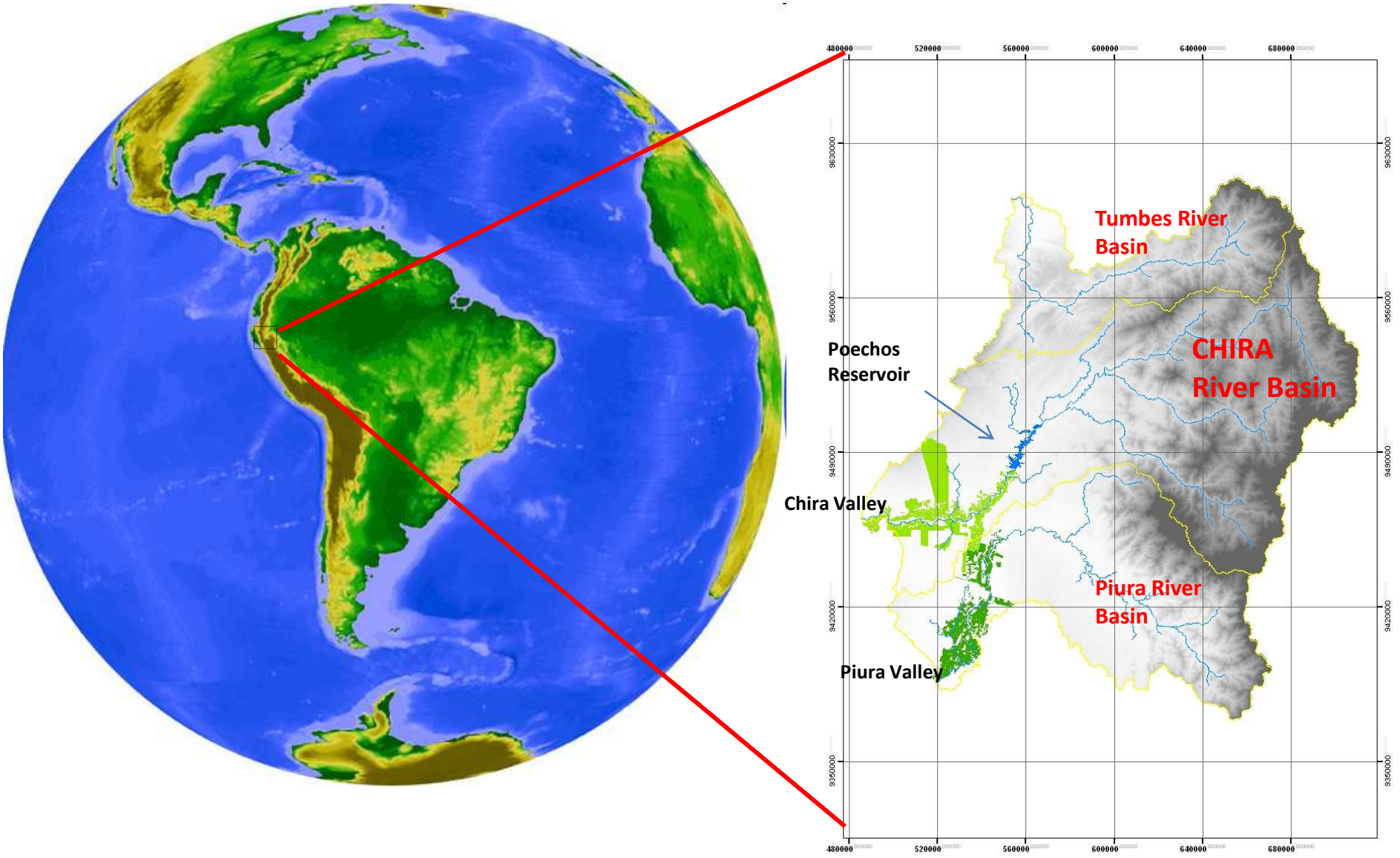
PROJECT GCP/INT/020/GER
Bioenergy and Food Security

Assessment of Bioenergy Crops introduction on Water Resources Sustainability

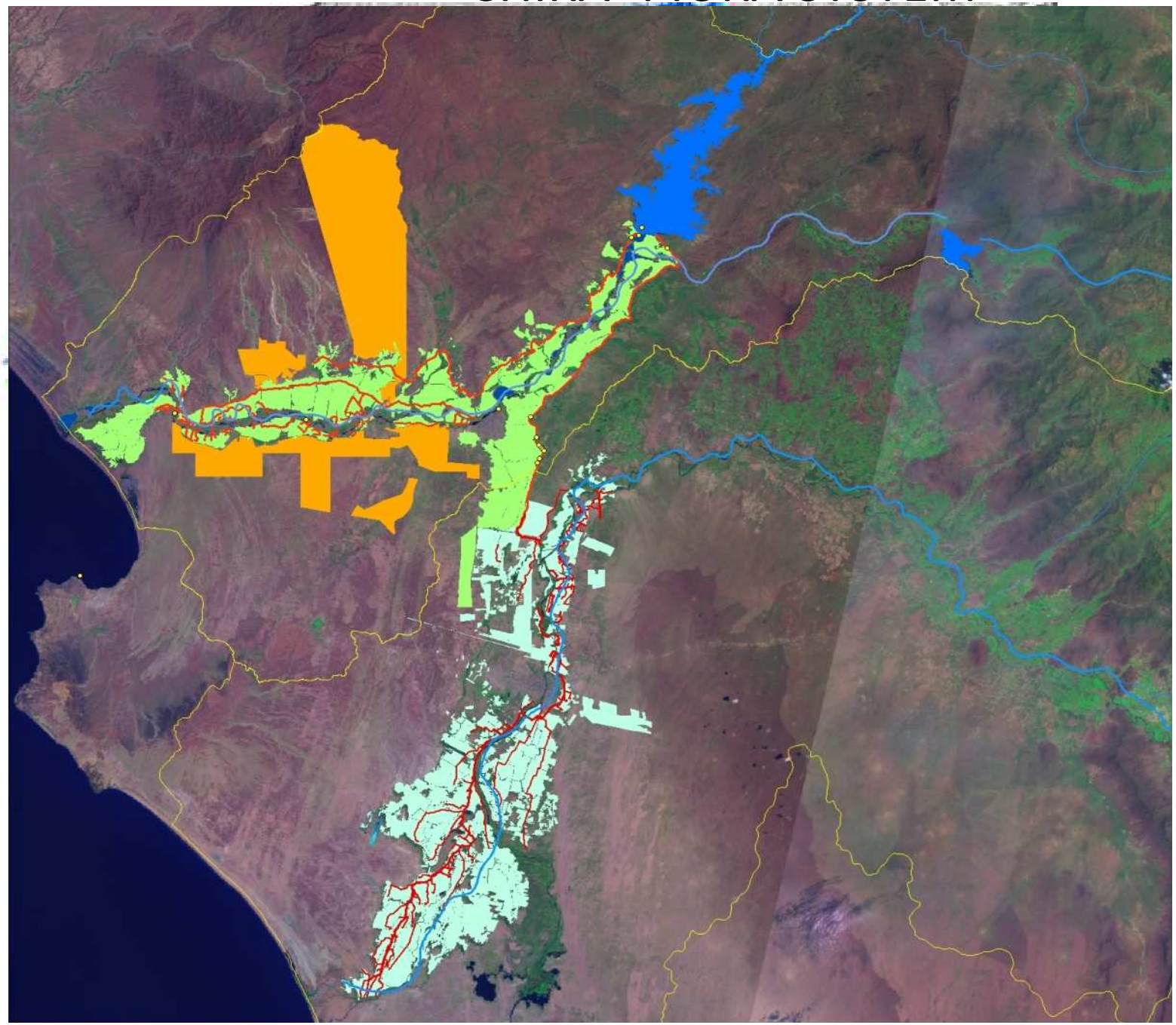
Case Study: Chira-Piura System, Peru

Cayo Ramos

CHIRA-PIURA SYSTEM - LOCATION



CHIRA- PIURA SYSTEM



OBJECTIVES

❖Apply the WEAP (Water Evaluation and Planning System) model on the Chira-Piura System considering the introduction of bioenergy crops and assessing effects on water resources supply and demand.

Scenarios:

✓ 1- Current crop pattern situation
✓ 2- Increasing areas with sugarcane
✓ 3- Increasing areas with sorghum
✓ 4- Increasing areas with sugarcane and farmers' crops.

❖ Associate the results to the benefits/consequences regarding food security.



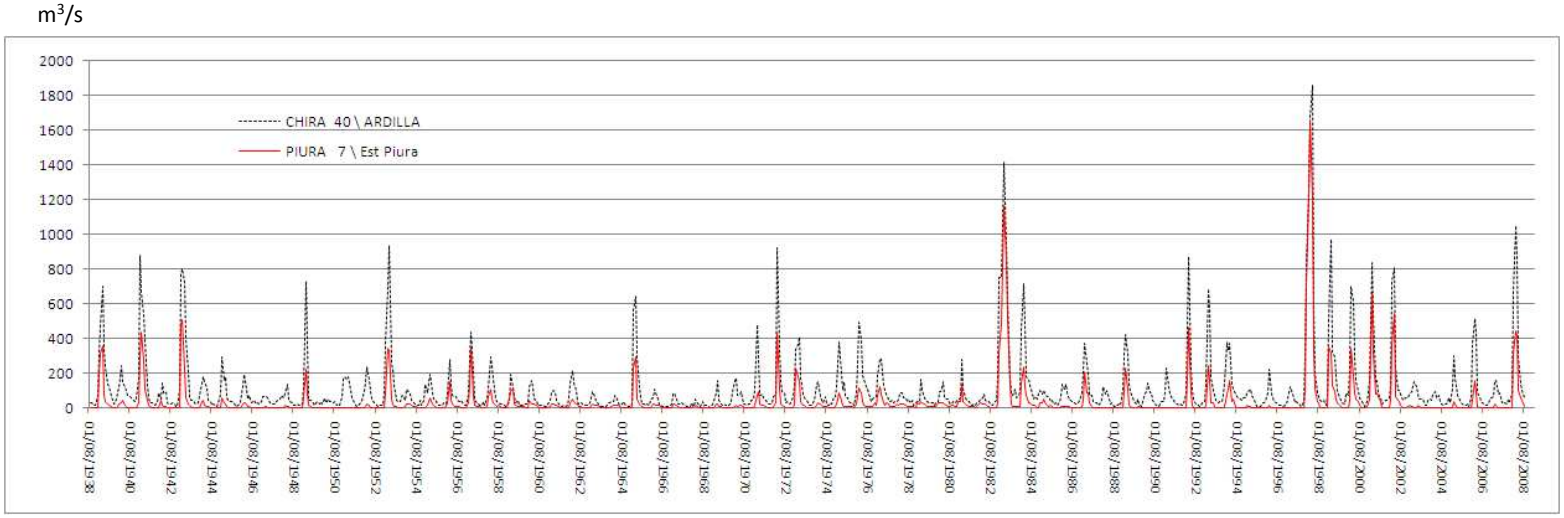

WATER PRODUCTIVITY

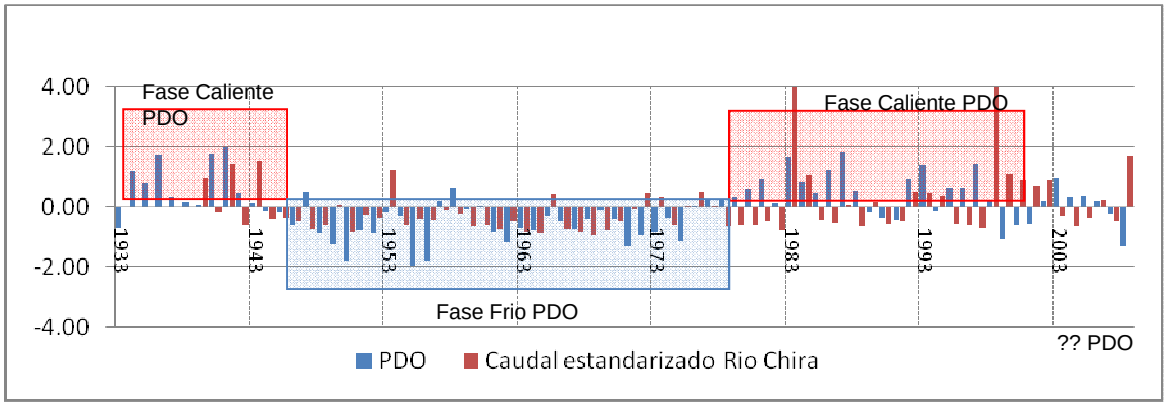
YEAR	CHIRA-PIURA SYSTEM		CHIRA AND PIURA VALLEYS	
	GROSS VOLUME, MILLION CUBIC METERS, MCM	NET VOLUMES, AT FARM GATE, MCM	PRODUCTION, MAIN AGRICULTURAL CROPS, THOUSAND METRIC TONS	WATER PRODUCTIVITY MT/Mm3
2006	1,415	837	1,141	1.36
2008	1,577	1,017	1,178	1.16
2008	1,504	941	1,238	1.32
AVERAGE				1.28

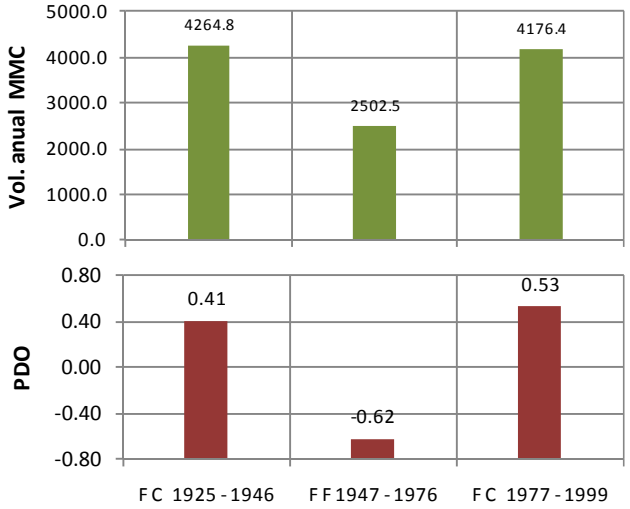
SOIL AND WATER PRODUCTIVITY FOR RICE IN THE CHIRA VALLEY

	UNIT	2003	2004	2005	2006	2007	2008
		12months	12m months	12 months	12 months	12months	12 months
Paddy rice	Metric tons	368,598	255,417	426,374	359,173	400,341	520,367
Cropped area	Ha	23,623	23606	30,265	29,487	30,007	31,821
Water used	MCM	591	590	757	737	750	796
Land productivity	MT/ha/year	16	11	14	12	13	16
Water productivity	Kg/m3	0.6	0.4	0.6	0.5	0.5	0.7

Chira discharge and Pacific Decadal Oscillation (PDO)







Nathan Mantua ,Washington University: Cold season 1890 – 1924 y 1947 – 1976 Hot season: 1925 – 1946 y 1977 - 2000s

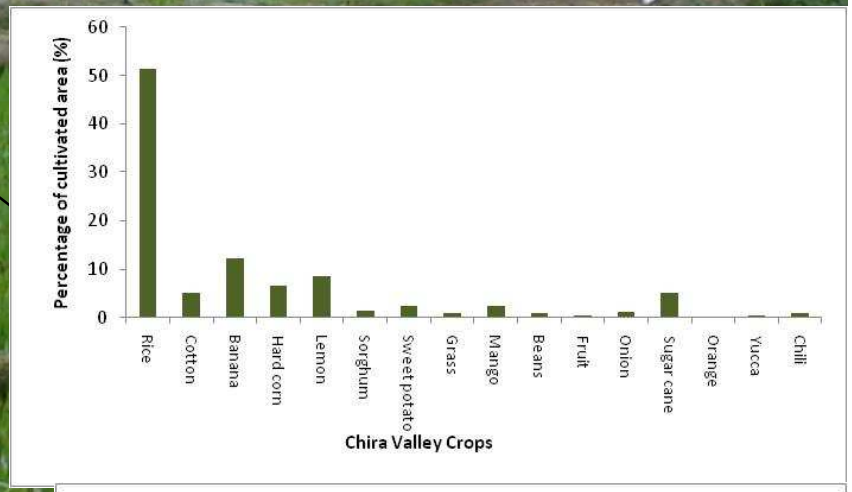
Agricultural demand

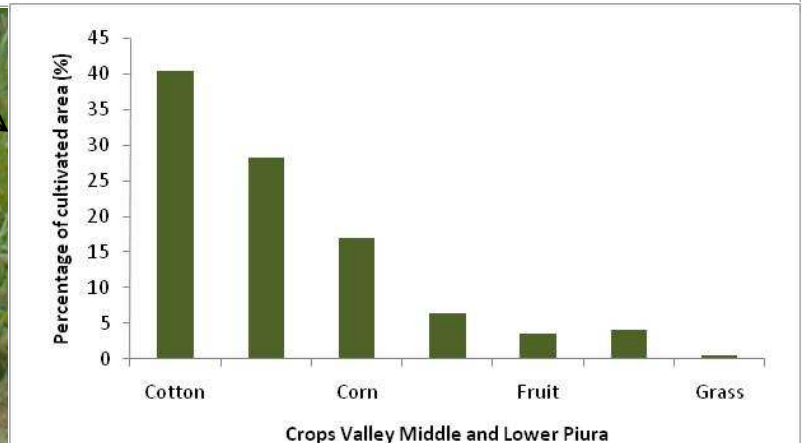
Chira valley

- Cropped area: 41,133 ha (43,934 irrigable area)
- Planned area under Sugarcane : 22, 280 ha (50% of cropped area)

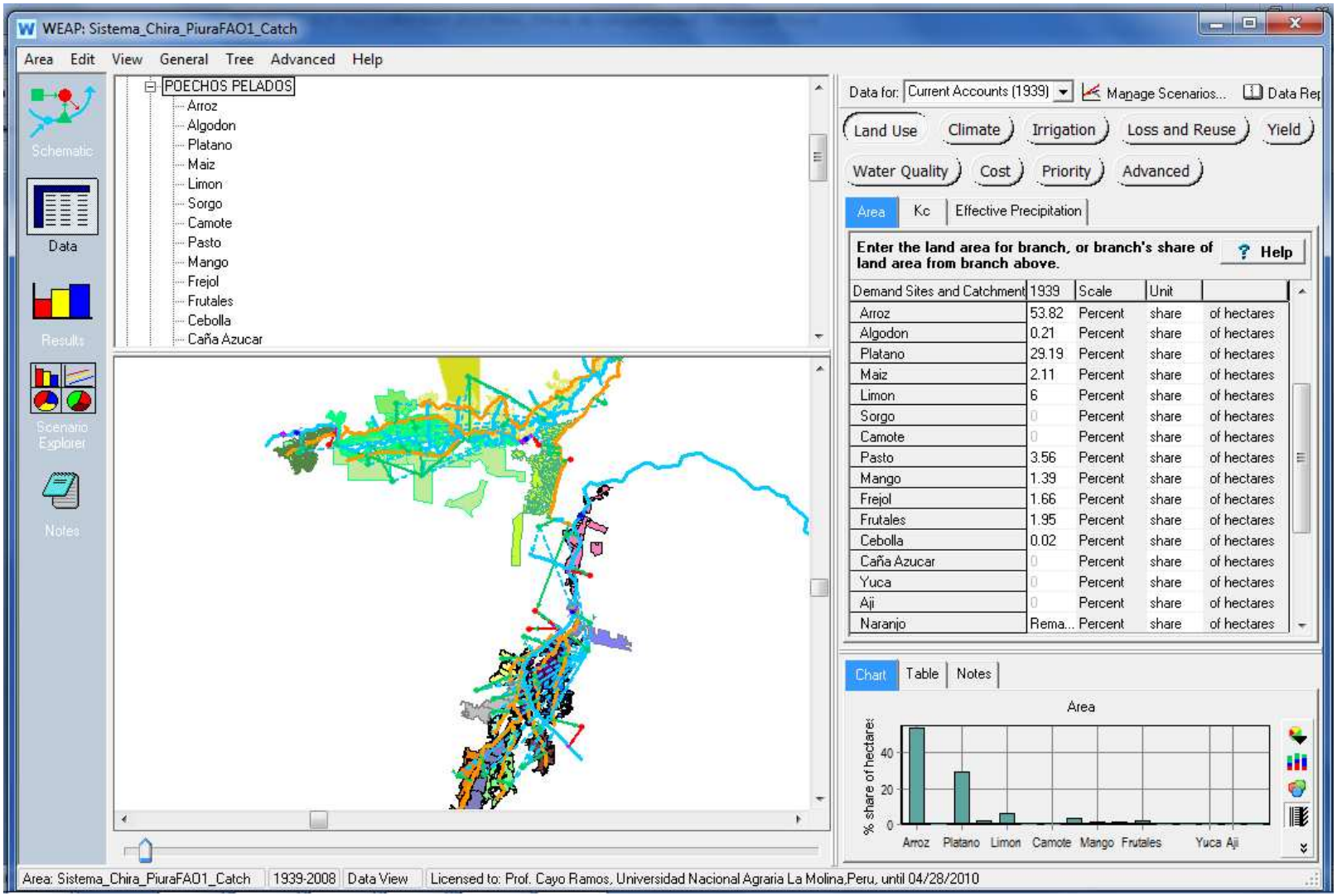
Piura valley

- Cropped area: **43,182 ha** (**49,305** irrigable area)

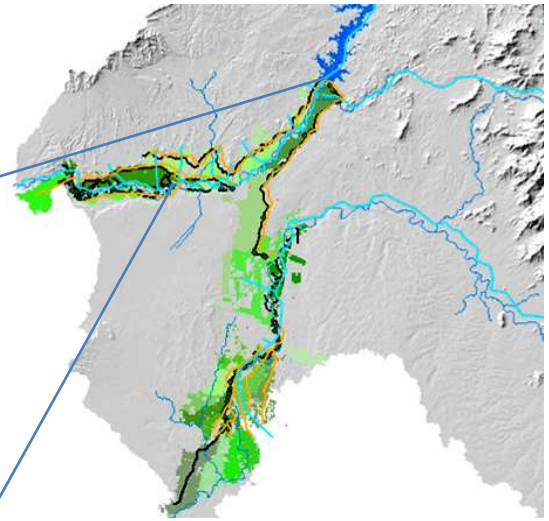




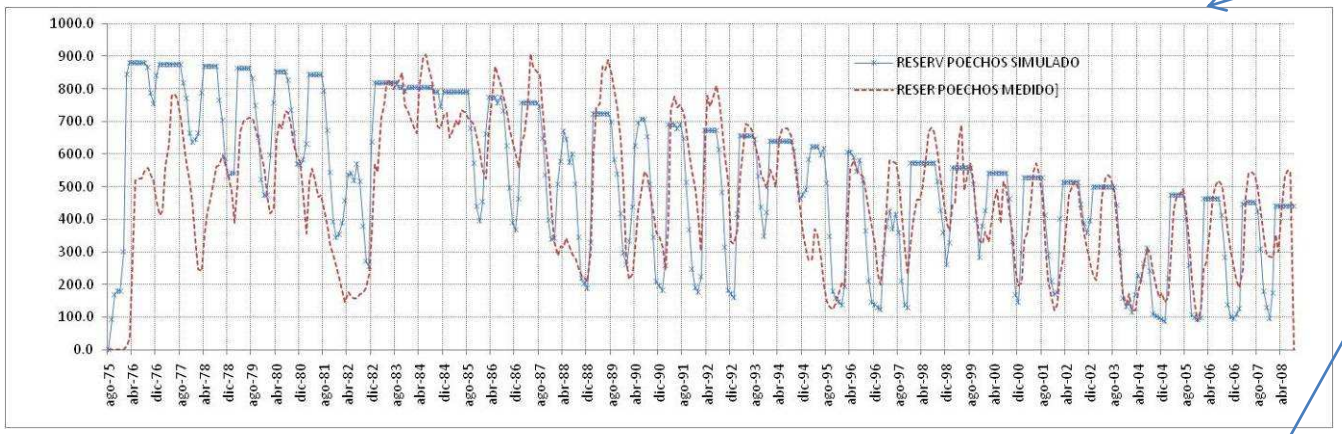
Chira Piura System in WEAP



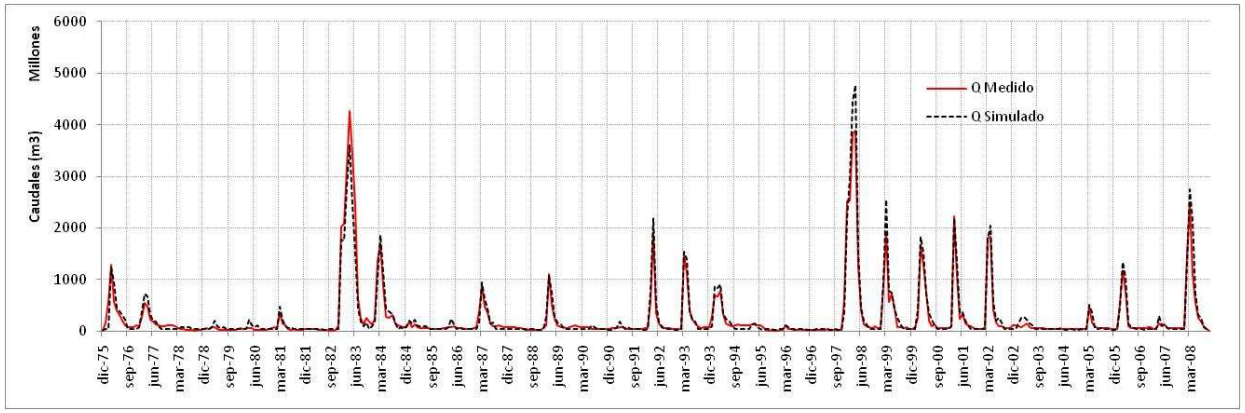
Calibration



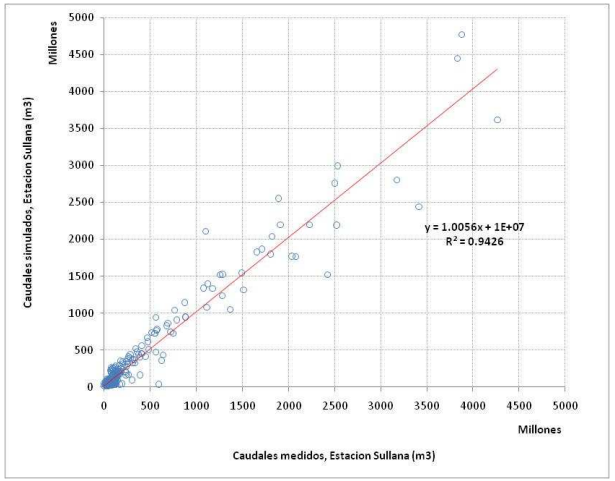
Reservoir storage



Model & measure discharge in Sullana station



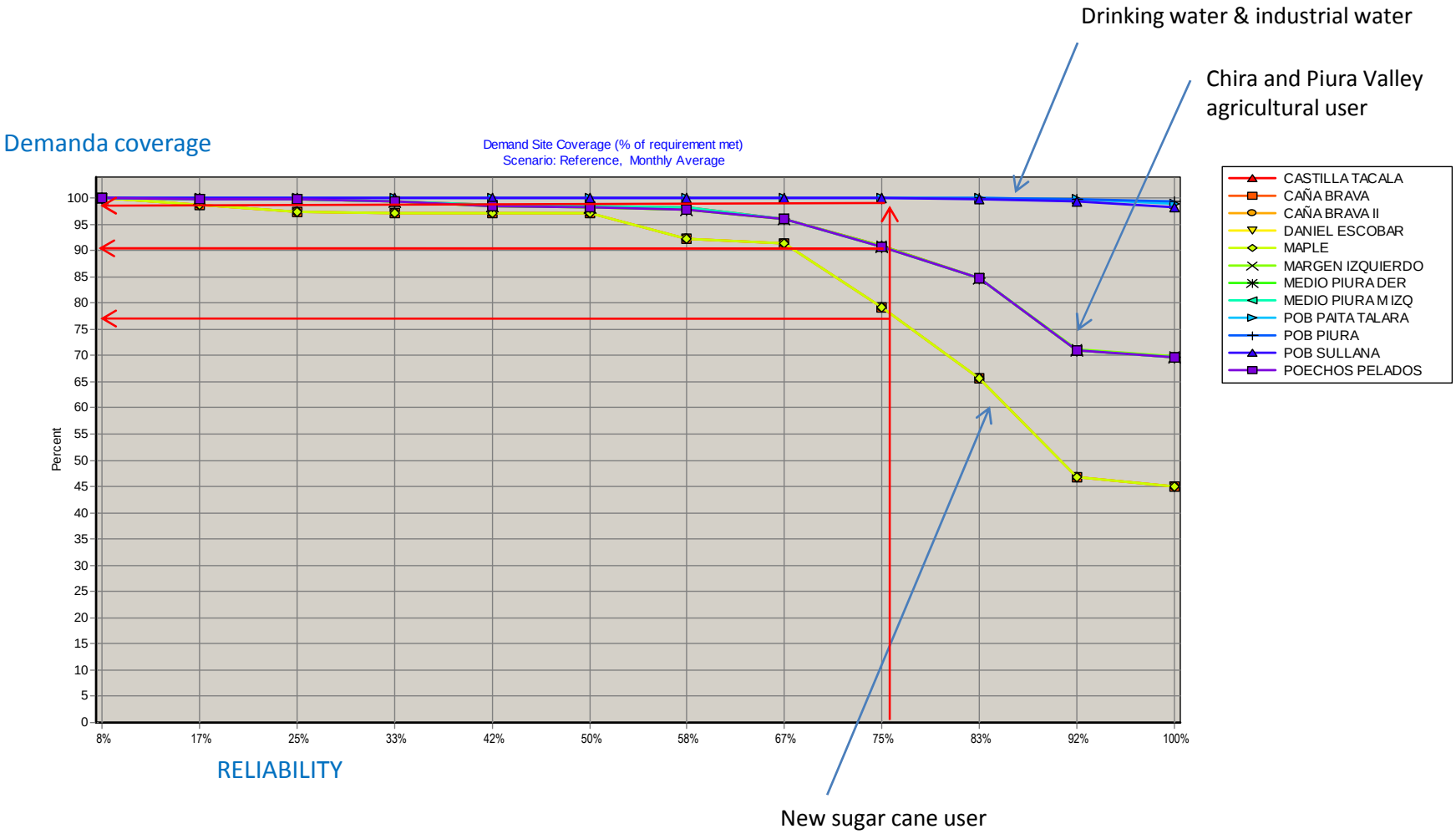
Discharge correlation in intermediate point (Sullana station)



RESULTS

- Scenarios 2, 3 and 4 show a reduction in reliability, with a decrease in attended demand . The latter fell from 90 percent (baseline) to 84, 89 and 85 percent for farmers and from 80 percent to 60, 74 and 52 percent for energy crops.
- Water resources planning is urgent and very much needed at the Chira-Piura system. This would bring an improvement in water productivity , this is, increased food production with the same volume of water and the same area.

E 1: Current Scenario

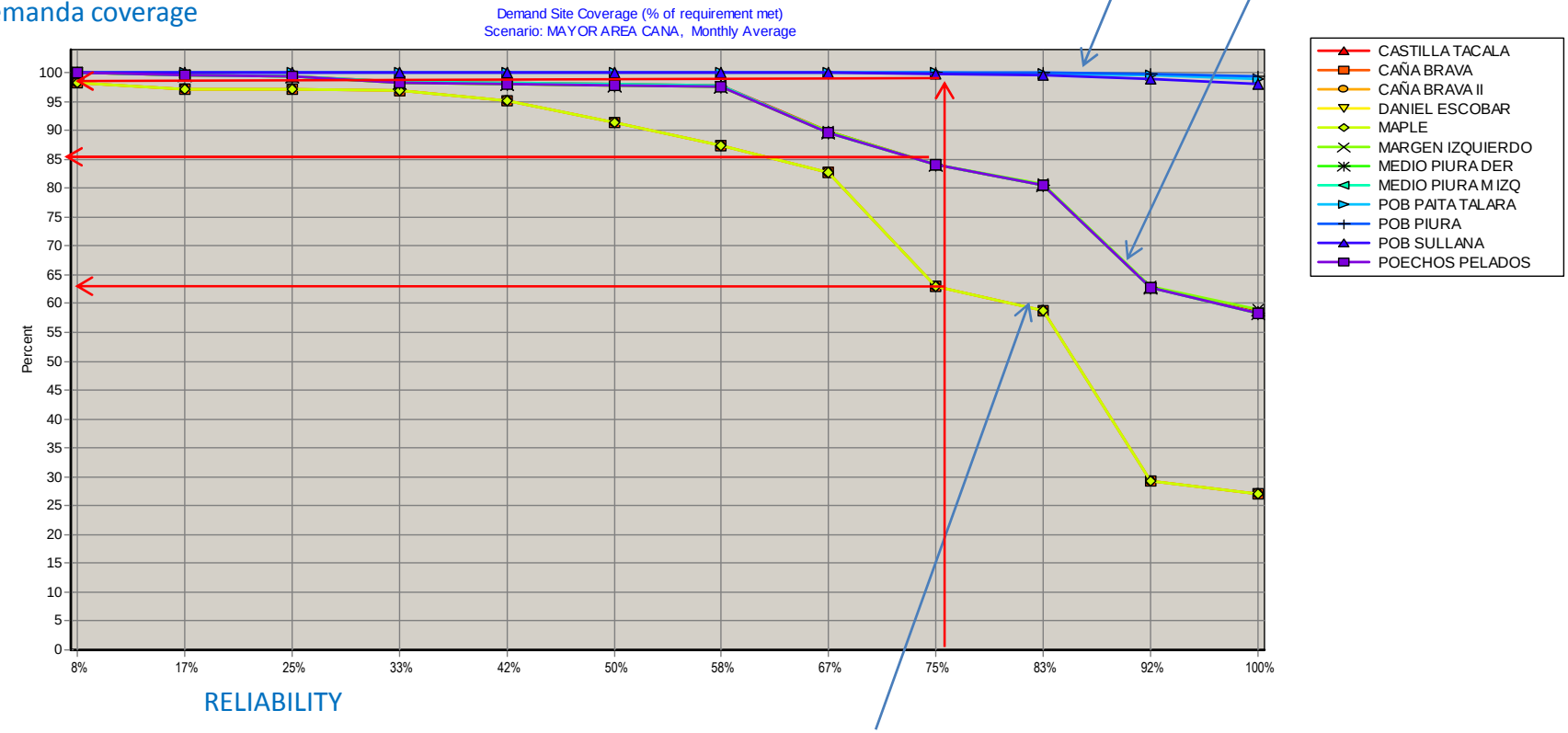


E 2: SCENARIO WITH CANE AREA ADD

Drinking water & industrial water

Chira and Piura Valley agricultural user

Demanda coverage



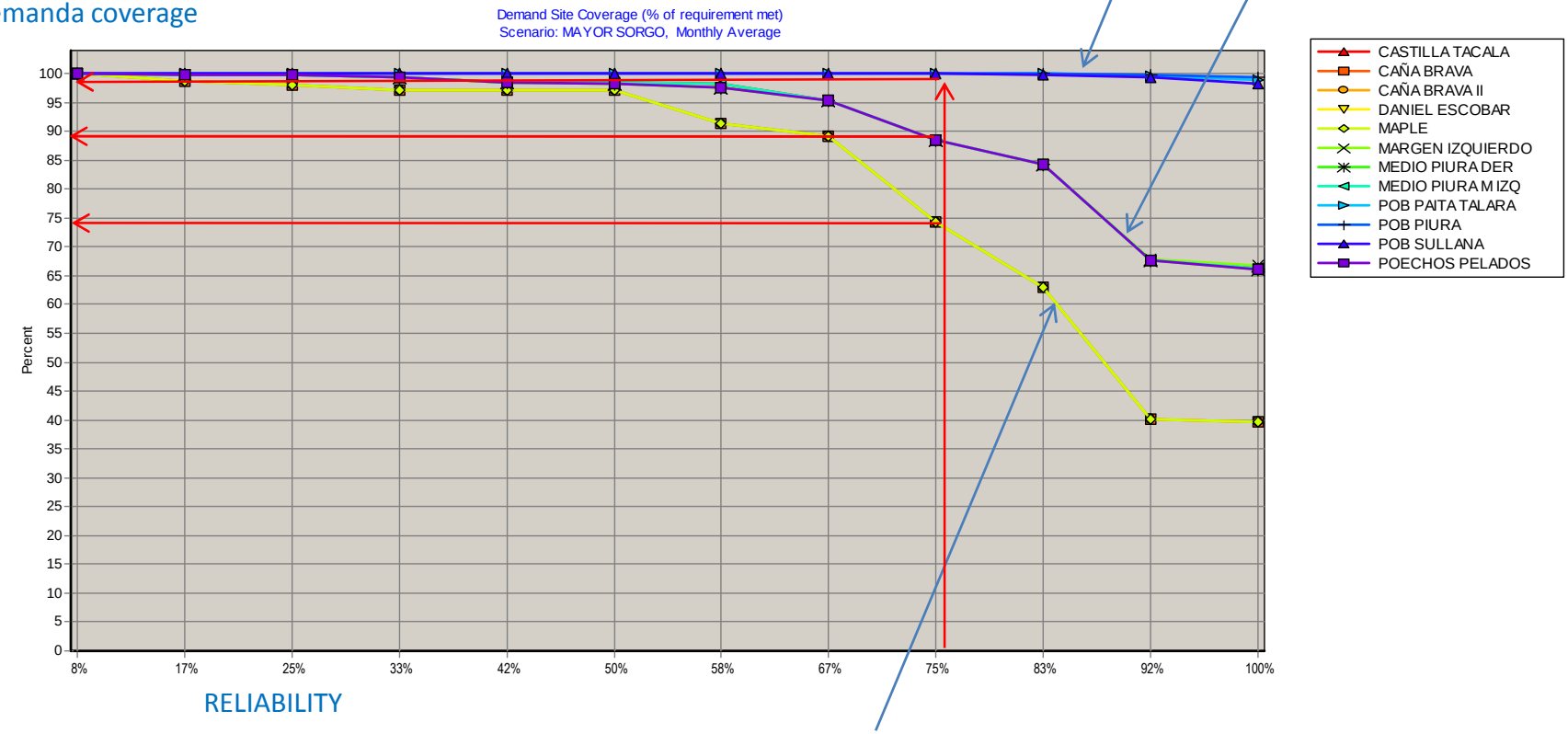
New sugar cane user

E 3: SCENARIO WITH AREA OF SORGHUM ADD

Drinking water & industrial water

Chira and Piura Valley agricultural user

Demanda coverage



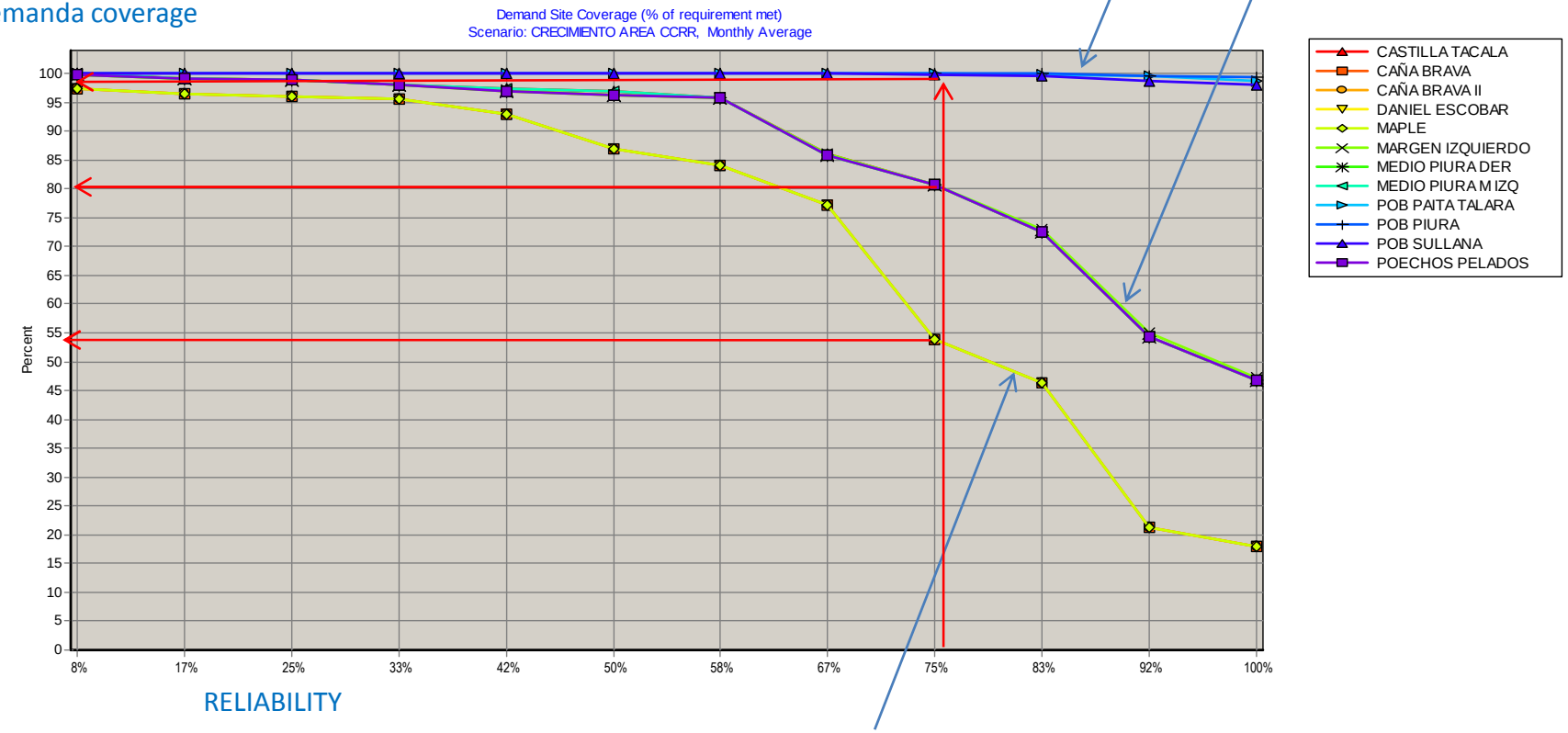
New sugar cane user

E 4: SCENARIO WITH AREAS OF CANA ADD AND EXPANSION IRRIGATED AREAS of FARMER

Drinking water & industrial water

Chira and Piura Valley agricultural user

Demanda coverage



New sugar cane user

CONCLUSIONS

- The study shows that water supply is insufficient to cover the demand if the cultivated areas are increased with the same cultural practices.
- Water availability limits the growth of cropped areas up to 50% of the planned area with sustainable irrigation and improved technology.

RECOMMENDATIONS

- Improvement of water availability in the system.
- Increasing the water storage capacity of Poechos (reservoir)
- Implementation of watershed protection measures to reduce soil erosion.
- Improvement of water use efficiency and productivity.
- Support a balanced increase of cropped areas with energy an food crops.


THANKS
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