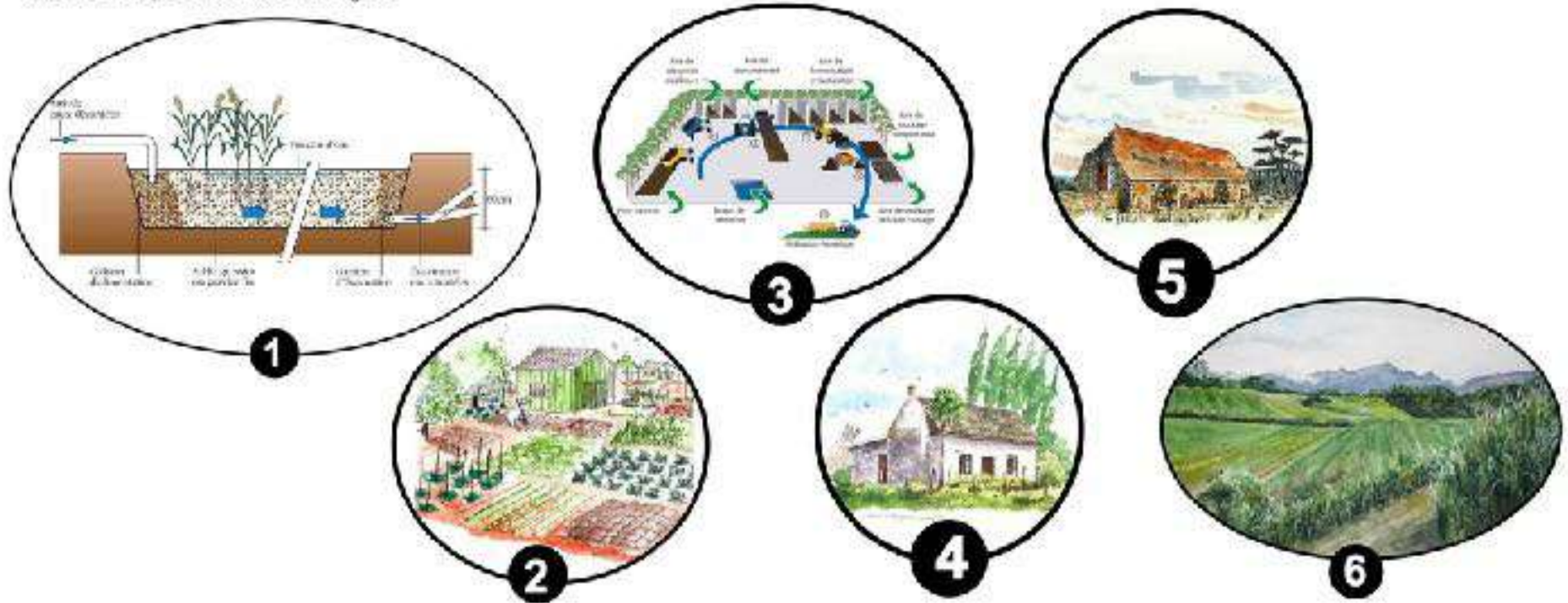


PILOT PROJECT TO VALORIZE THE REUSE OF TREATED WASTEWATER IN THE IRRIGATED AREA OF BORJ TOUIL OF THE ARIANA GOVERNORATE

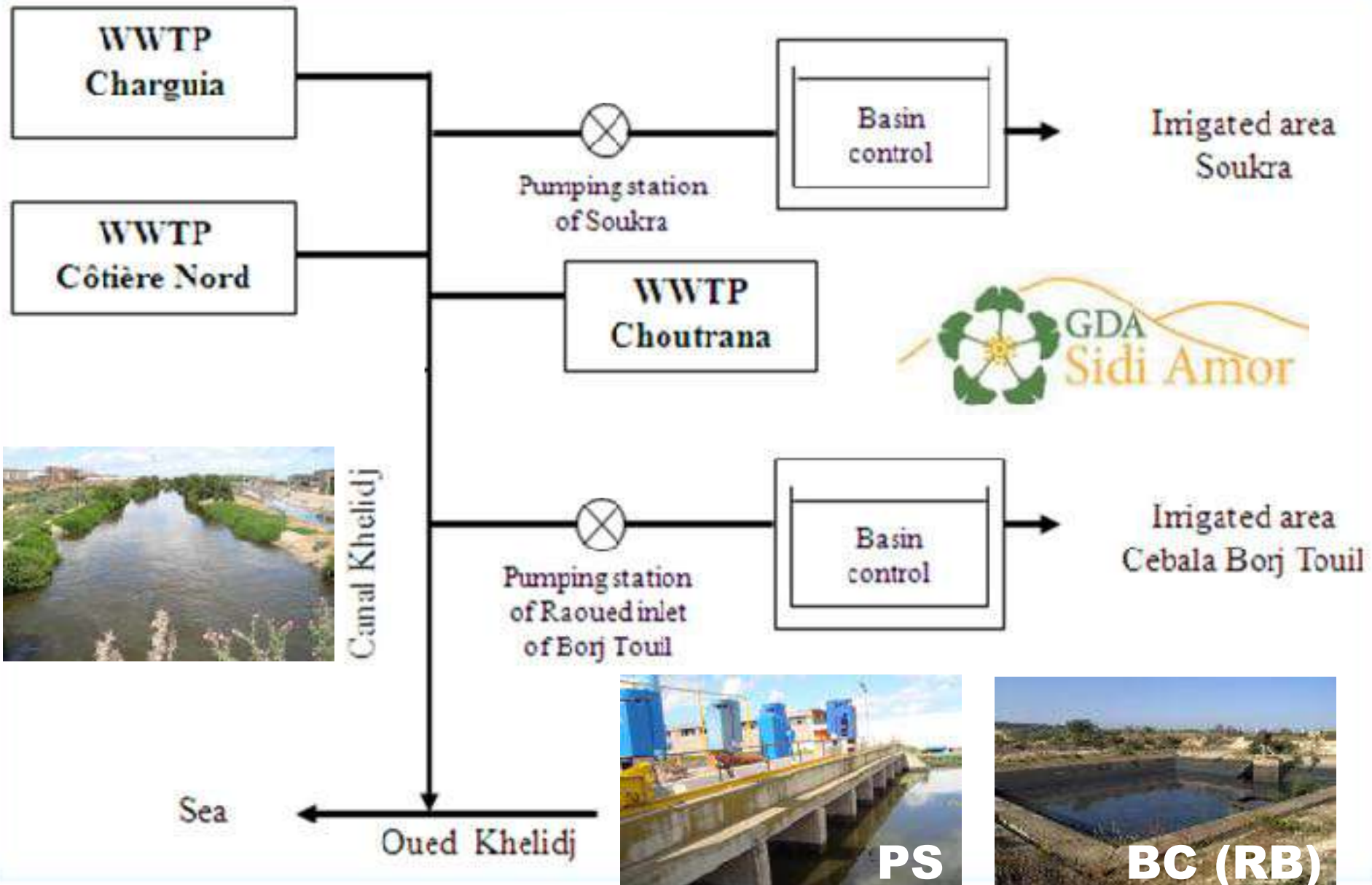
COMPONENTS OF THE SIDI AMOR PILOT PROJECT

1. Construction of a constructed wetlands and sand filters
2. Establishment of an experimental and demonstration plant nursery
3. Establishment of a composting and valorization plant for sewage sludge
4. Resource Center: Experimental, Demonstration and Training Site on Wastewater Technology, Information Sharing, Networking
5. Laboratory: analyzes and evaluation of the quality of wastewater
6. Establishment of test and demonstration plots at the Sidi Amor site and among farmers in the irrigated area

dans le périmètre irrigué



PUMPING STATION AND ADDUCTION OF TREATED WASTEWATER

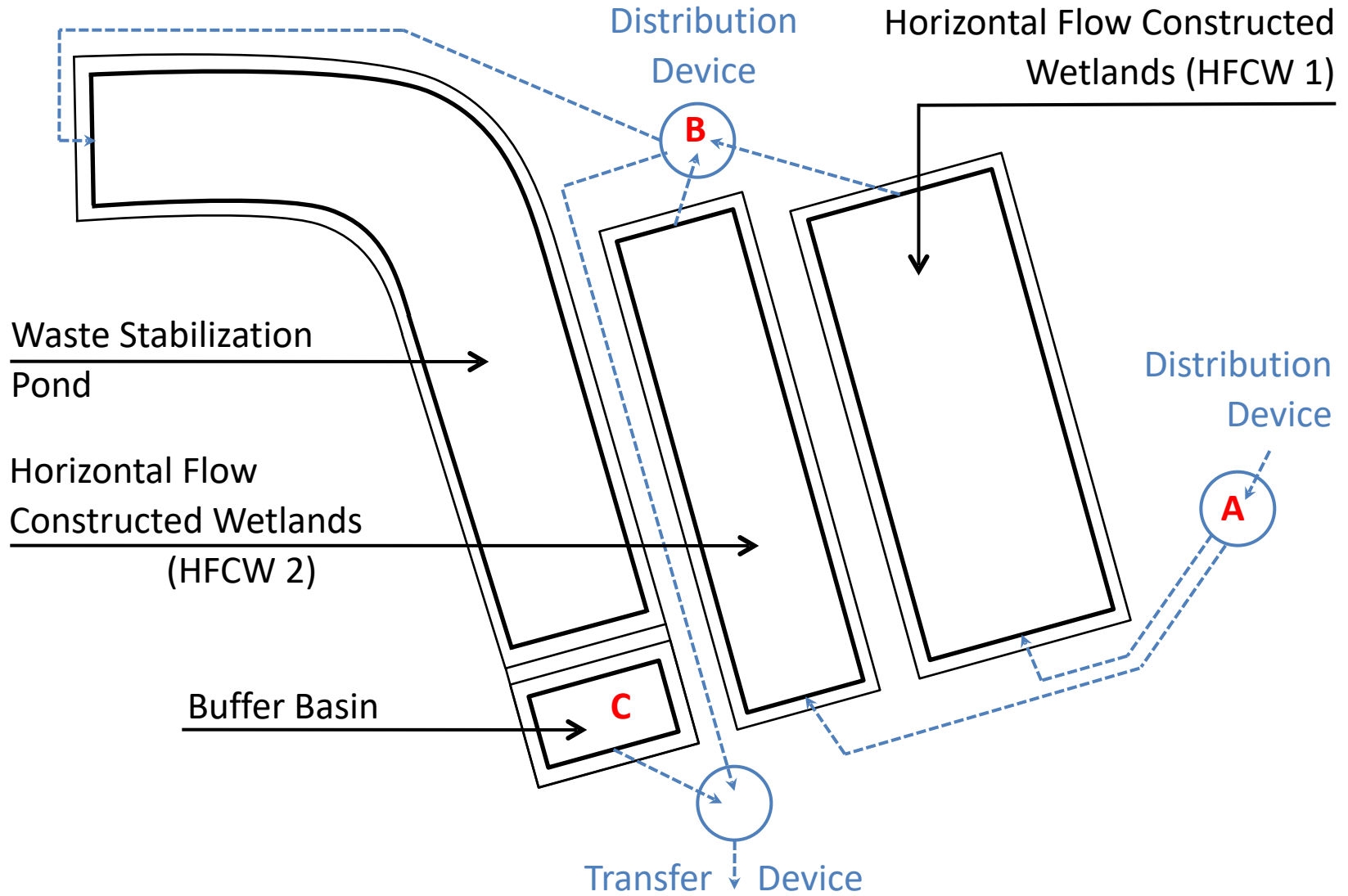


CRDA data	2012	2013	2014
TSS	77	82	87
COD	107	112	66
BOD ₅	43	50	46

**Quality of the treated wastewater in both Regulation Basin (BC) and Pumping Station (PS):
First influent control (May – June – July 2015)**

Parameter	Unit	RB (14/05)	PS (29/05)	PS (12/06)	PS (24/06)	PS (29/06)	PS (13/07)	NT 106.02 (P.S.N.)	NT 106.02 (P.H.D.)
pH		7.45 (25.7 °C)	7.55 (21.5 °C)	-	-			6.5 to 9	6.5 to 8.5
TSS	mg/L	250	84	79	520		150	400	30
COD	mgO ₂ /L	423	213	135	757		120	1000	125
BOD ₅	mgO ₂ /L	140	52	39	190		77	400	30
Chlorides	mg/L	-	-	-	-		625	700	700
TKN	mgN/L	85.1	32.2	37.6	129		29.6	100	5
Ammonia nitrogen	mgN/L	26.5	18.5	-	-		-	-	-
Nitrates	mgN/L	<0.45	<0.45	-	-		-	90	50
Nitrites	mgN/L	0.039	0.014	-	-		-	10	0.5
TP	mgP/L	4.88	5.89	2.65	6.2		1.72	10	2
FC	log CFU/100 mL	>5.04	-	>3.04	-		-	-	3.30
FS	log CFU/100 mL	>5.04	-	>3.04	-		-	-	3.00
Salmonella	/100 mL	Absence	-	-				-	Absence

TSS 100 mg/l COD 160 mgO₂/l BOD₅ 60 mgO₂/l





WASTEWATER POST-TREATMENT PLANT



MARCH 2016

Quality of the treated wastewater following the impoundment of the post-treatment system: First compliance test (August 2016)

Parameter	Unit	A	B	C	NT 106.02 (P.S.N.)	NT 106.02 (P.H.D.)
pH	-	7.5 (22.5 °C)	7.45 (21.2 °C)	8.55 (24.4 °C)	6.5 to 9	6.5 to 8.5
EC	mS/m	384 (22.7 °C)	435 (21.5 °C)	636 (24.7 °C)	500	500
TSS	mg/L	790	2.4	9.8	400	30
COD	mgO ₂ /L	797	30	49	1000	125
BOD ₅	mgO ₂ /L	104	8	6	400	30
Chlorides	mg/L	819	958	1.54 10 ³	700	700
TKN	mgN/L	58.2	7.32	5.09	100	5
TP	mgP/L	4.90	0.90	1.12	10	2
FC	log CFU/100 mL	4.63	2.84	2.47	-	3.30
FS	log CFU/100 mL	3.60	2.60	1.63	-	3.00
Salmonella	/100 mL	Absence	Absence	Absence	-	Absence
V. Cholerae	/100 mL	Absence	Absence	Absence	-	Absence
H. eggs	/5 L	Absence	Absence	Absence	-	<1/L

FEBRUARY – MARCH 2016

LABORATORY

COMPONENTS OF THE PROJECT (IN PROGRESS)





COMPOSTING AREA

COMPONENTS OF THE PROJECT (IN PROGRESS)



EPUVALISATION

TRAINEES...



MARCH 2016



OAT THATCH

MARCH 2016

CROP DIVERSIFICATION TRIALS



COTTON (100 m²) ?

APRIL 2016

APRIL 2016



IRRIGATION AND FILTRATION SYSTEMS



APRIL 2016

MAY 2016



GRADUATION PROJECTS INTERSHIPS – 2016



MAY 2016

MAY 2016



IRRIGATION WATER: THE QUESTIONS OF QUALITY AND QUANTITY



MAY 2016

MAY 2016



FILTER CLOGGING...



MAY 2016



WHICH IRRIGATION SYSTEM ?





LAND USE AND IRRIGATION

2016 | Original Paper | Chapter

Land Use Land Cover Mapping of Borj Touil (Northern Tunisia) Irrigated District with Reclaimed Water Using Landsat-8 and Sentinel-2 Satellite Images

Authors: Asma Bettaibi, Makram Anane, Karim Ergaleg

Publisher: Springer International Publishing



Published in: Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions



JULY 2016

SUMMER TRAINING 2016



JULY 2016



SEPTEMBER 2016

PESTS AND PESTICIDES



AUGUST 2016

SOME KEY FIGURES

Rendement moyen	2 à 5 t seed-cotton / ha	Borj Touil 0.672 t
Rendement égrenage	33 à 38 %	Borj Touil 37.75 %
Rendement fibre	660 à 1600 kg/ha	Borj Touil 293.7 kg/ha



Bale ID	SCI	Grade	Mst [%]	Mic	Mat	UHML [mm]	UI [%]	SF [%]	Str [g/cm]	Flg [%]	Rd	rb	CGrd Upland	TrCnt	TrAr [%]	TrID TrGrd	Amt
n	5																
Average	148		10.3	4.71	0.87	28.90	86.3	6.3	31.7	7.3	72.5	9.8	42-1	12	0.12	1	588
Std Dev	9		0.2	0.18	0.00	1.63	1.5	1.1	0.6	0.8	1.9	0.8		6	0.07		52.6
CV%	5.9		1.5	3.9	0.3	5.6	1.8	17.3	1.8	7.0	2.6	8.8		47.2	69.3		8.8
Q95% +/-	18		0.3	0.39	0.00	3.35	3.2	2.2	1.2	1.0	3.9	1.1		12	0.14		109.3
Min	130		10.1	4.59	0.86	28.68	83.7	4.6	31.2	5.8	69.7	8.7		6	0.06		529
Max	159		10.6	5.03	0.87	30.88	87.6	7.4	32.7	8.1	74.9	10.6		20	0.22		657

SEPTEMBER 2016



STUDENT FIELD TRIPS

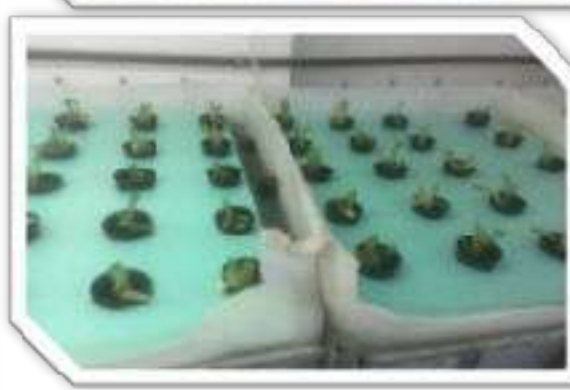


SEPTEMBER 2016

JANUARY – OCTOBER 2016

Implementation test of an aquaponic system performed by Baya Aissaoui

Research Unit of Ecosystems and Aquatic Resources (INAT)





THE PROJECT SIDI AMOR INVITED TO COP 22

CoOPLA-NET

Les Pilotes du Changement / the Change Pilots



An international network of experts supporting stakeholders at all levels (from communities to governments, NGOs, companies and scientists) in CoO- designing, implementing, adapting, evaluating effective and sustainable change processes using the CoOPLAaGE principles and methods

JANuary 2017



EXPERIMENTAL PLOTS OF ROSE AND GERANIUM



JANUARY 2017

JANUARY 2017



TEAMWORK GDA SIDI AMOR – INAT AT BORJ TOUIL



JANUARY 2017



TEAMWORK GDA SIDI AMOR – INAT AT BORJ TOUIL

A SUMMER IN
BORJ TOUIL

4:12

A summer in Borj Touil
on Vimeo

Oussama Houj
Vimeo - 25 févr. 2017



FEBRUARY 2017



UNITED NATIONS
ENVIRONMENTAL PROGRAMME
UNEP



WORLD BANK GROUP

LEAP 100

Mediterranean Water **Heroes** Youth Contest

YOUTH INNOVATION...



YOUTH INNOVATING WITH WASTEWATER FOR A SUSTAINABLE MEDITERRANEAN WASTEWATER REUSE – MARS 2017, MARSEILLE



APRIL 2017



BORJTOUILIAN

[HTTPS://WWW.FACEBOOK.COM/BORJTOUILIAN/](https://www.facebook.com/BORJTOUILIAN/)

PINK SOLUTION...



APRIL 2017

APRIL 2017



WHICH IRRIGATION SYSTEM WITH REGARD TO WASTEWATER QUALITY...



APRIL 2017

APRIL 2017



PRÉPARATION OF THE FESTIVAL OF THE ROSE



Dignosti la chaîne de valeur de la Rose de l'Ariana



PROPOSAL FOR REGIONAL DEVELOPMENT PLAN

Faten khamassi Enseignante chercheur INAT
Nadia Azza étudiante en 3^{ème} CI INAT

Forces

3000 ha terres irrigables avec l'eau traitée à Borj Touil

Petite précocité

Producteur de roses / savoir faire
GDA Sidi Amor

Développement de pépinières

Opportunités

Un taux d'accroissement en valeur en augmentation continue **+ 27%**

Le développement du tourisme médical

Proposition des produits de niche de qualité

Forte rentabilité à l'ha

Faiblesses

Absence d'appui spécifique au niveau de la filière

Seulement **300 ha en irrigué** avec l'eau traitée sont actuellement utilisé par les agriculteurs, **pour diverses raisons techniques**

Logistique transport / conditionnement et export n'est pas encore mise en place

Analyse SWOT

Menaces

Concurrence mondiale de plus en plus rude

Imposition d'un quota sur le marché de l'UE

Abandon des savoir faire traditionnels

Développer l'international au détriment du local

**FESTIVAL OF THE
ROSE AT INAT
14 MAY 2017**

50 TIPS TO MAKE FRAGRANCE REVOLUTION



COM' SCI

PARTENARIAT UNESCO

**CYCLE DE CONFÉRENCES
SCIENTIFIQUES**



EAU **CHANGEMENT CLIMATIQUE & SOCIÉTÉ**

Une conférence-débat avec :

FLAVIA SCHLEGEL

Sous-Directrice générale de l'UNESCO

ABDELGHANI CHEHBOUNI

Directeur de Recherche IRD, Marou

CHRISTIAN LEDUC

Directeur de Recherches IRD, Montpellier

KARIM ERGAIEG

Chercheur à l'INAT

JEUDI 18 MAI 2017 / 16H30 > 19H

Auditorium de L'Institut français de Tunisie
20 / 22, Avenue de Paris - Tunis



www.institutfrancais-tunisie.com

MAY 2017



FARMERS SEEM TO BE INTERESTED IN GERANIUM...

MAY 2017



JUNE 2017



WHAT I'VE LEARNED IN A SINGLE YEAR IN BORJ TOUIL AND WITH GDA SIDI AMOR...

AUGUST 2017



**"Zabaltuna", the awarness campaign
launched by a young Tunisian in pictures**

**A young Tunisian 27 years old has
embarked on an ambitious adventure...**



JULY – AUGUST 2018

JULY 2017



SUMMER TRAINING 2017



AUGUST 2017



SUMMER TRAINING 2017

JULY 2017



PLATFORM FOR EXCHANGE AND INSPIRATION FOR YOUTH



NOVEMBER 2017



PLATFORM FOR EXCHANGE AND INSPIRATION FOR YOUTH



NOVEMBER 2017



OCTOBER 2017



JANUARY 2018

ONE YEAR LATER



FEBRUARY 2018

FEBRUARY 2018



SCHOOL VISITS – ENVIRONMENTAL EDUCATION



FEBRUARY 2018



FEBRUARY 2018

PARTNERS – TRAINING



FEBRUARY 2018



FEBRUARY 2018

GDA SIDI AMOR –BORJ TOUIL IRRIGATED AREA



FEBRUARY 2018



FEBRUARY 2018

MONITORING OF EXPERIMENTAL PLOTS



FEBRUARY 2018



MARCH 2018

PLATEFORME OF EXCHANGE AND LEARNING



MARCH 2018



MARCH 2018

NATURE- BASED SOLUTION FOR WATER AND CLIMATE CHANGE ADAPTATION IN MEDITERRANEAN AREA – EGYPT 2018





END OF MARCH 2018

BORJ TOUIL – GDA SIDI AMOR



END OF MARCH 2018



END OF MARCH 2018

DISTILLATION OF BORJ TOUIL GERANIUM AT GDA SIDI AMOR

END OF MARCH 2018



AT THE BEGINNING OF AVRIL 2018



NATURE-BASED SOLUTIONS

AT THE BEGINNING OF AVRIL 2018





NATURE-BASED SOLUTIONS



AT THE BEGINNING OF APRIL 2018



DRIP IRRIGATION SETUP AT BORJ TOUIL



AT THE BEGINNING OF APRIL 2018

LA PROMOTION DE LA REUTILISATION
DES EAUX USEES TRAITEES EN AGROFORESTERIE

Colloque du 24 avril 2018
Parc Nahli



En partenariat avec



Problématiques et Perspectives de Développement dans le
Périmètre Irrigué de Borj Toull-Ariana

*Réflexion à partir du site pilote de promotion de la Réutilisation
des Eaux Usées Traitées en agroforesterie au GDA Sidi Amor*

YOUTH ENGAGEMENT AND ADVOCACY...



Parameter	Unity	Inlet	HFCW1	HFCW2	BB
pH		7.18	7.22	7.18	8.12
Conductivity	μS/cm	3560	3560	3660	3680
Salinity	g/l	2.14	2.14	2.2	2.21
NaCl	%	7.2	7.3	7.1	7.12
Turbidity	NTU	11.8	8.3	7.6	19.5
COD	mgO ₂ /l	87	59	66	83
MES		34	20	16	29
BOD ₅	mgO ₂ /l	29	17	14	17
Temperature	°C	18.6	19	18.7	19.5
O ₂	mg/l	2.37	2.87	2.07	1.15

Source ONAS 24 avril 2018



MAY 2018

NATURE-BASED SOLUTIONS



MAY 2018



MAY 2018

THE QUESTION OF WASTEWATER QUALITY... SUMMER TRAINING...



JUNE 2018



JULY 2018

SUMMER TRAINING 2018



JULY 2018

**JULY 20, 2018 – LOCATION: CHEBIKA – TEMPERATURE 26 ° / 40 °
(IRRIGATION IN PROGRESS)**



GENERAL OVERVIEW OF THE PLOT: JULY 20, 2018 - AUGUST 22, 2018

**AUGUST 22, 2018 – LOCATION: CHEBIKA – TEMPERATURE 21 ° / 32 °
(SOIL MOISTURE QUITE HIGH)**



JULY 20, 2018
(Cotton bud – Cotton blossom)



Overview in the middle of the plot

AUGUST 22, 2018
(Cotton blossom – Cotton boll)



Height ~ doubled



AUGUST 2018

EM TRIALS – BORJ TOUIL



AUGUST 2018



SEPTEMBER 2018

FIELD TRIP WITH FARMERS OF BORJ TOUIL - LIVESTOCK AND PASTURE OFFICE (OEP)



SEPTEMBER 2018



OCTOBER 2018



NOVEMBER 2018



DECEMBER 2018

AGRONOMIC TRIALS CONTINUATION – BORJ TOUIL



MARCH 2019

JANUARY 2019



SCHOOL AND YOUTH VISITS

AVIIL 2019





COLLABORATION AND INNOVATION 2019 (IN PROGRESS)





COLLABORATION AND INNOVATION 2019 (IN PROGRESS)





OCTOBER 2019

