



Instituto de Ingeniería del
Agua y Medio Ambiente



UNIVERSIDAD
POLITECNICA
DE VALENCIA

Ribav Integration within Ripflow v.3

By:

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Institute of Water and Environmental Engineering



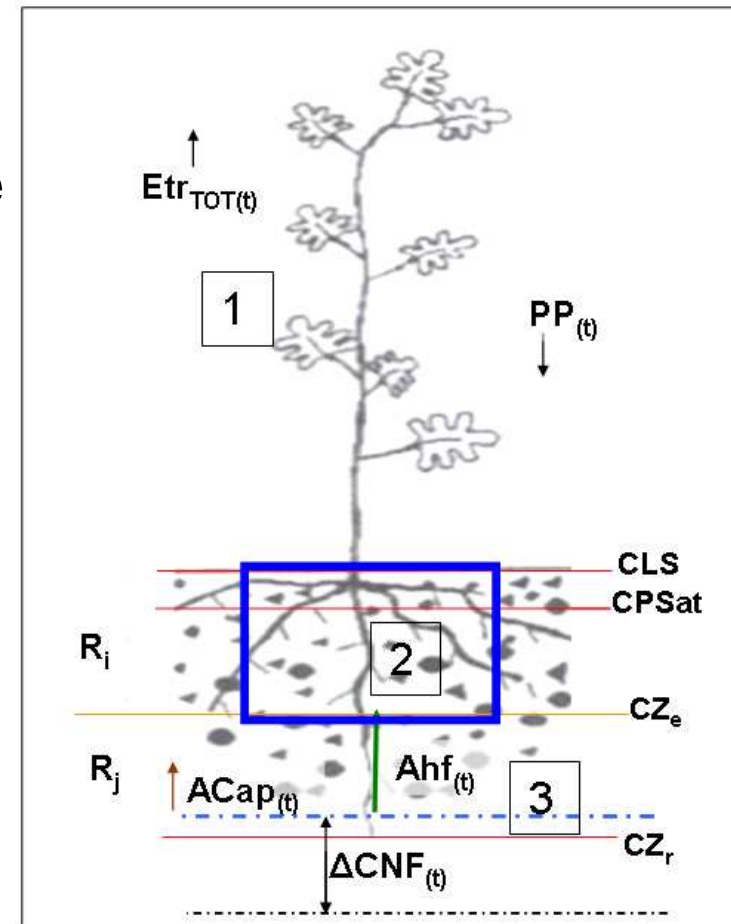
RIPFLOW PROJECT: Klagenfurt meeting 29/04/10

1. Ribav conceptualization.
2. Ribav Parameters.
3. Ribav 1D.
4. Ribav 2D.
5. Methods to integrate Ribav 2D within Ripflow.

1. RibAV conceptualization

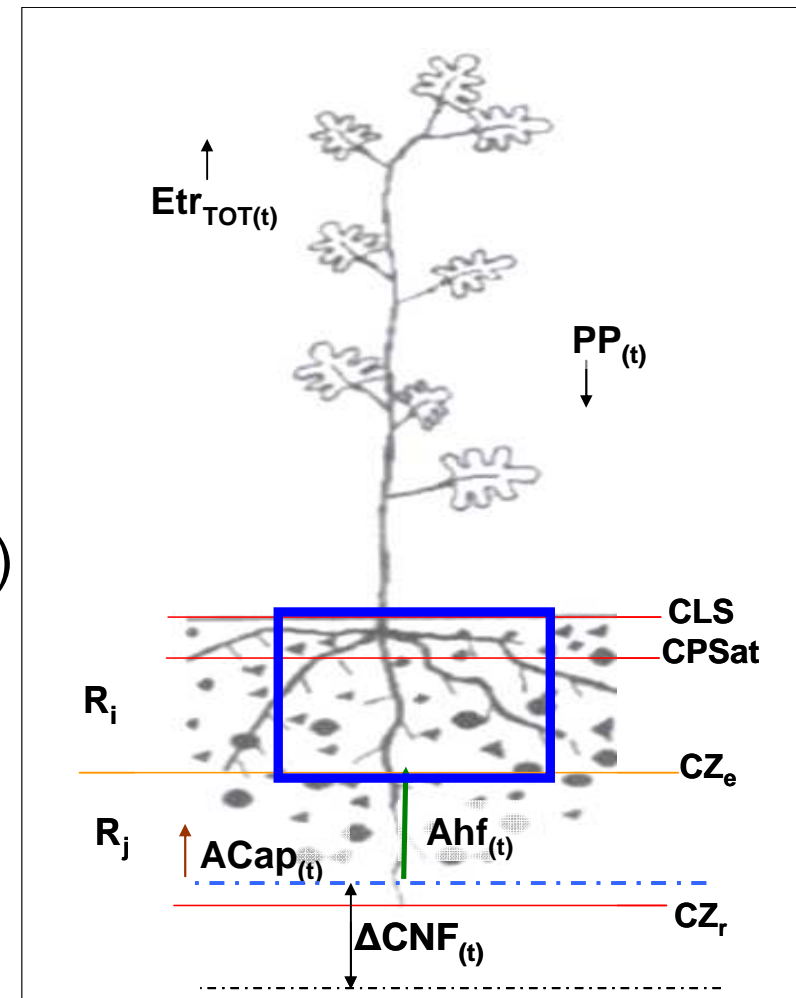
- Elements:
 - 1. Vegetation
 - 2. Static tank-unsaturated zone
 - 3. Saturated zone

- Inputs (time series):
 - $PP_{(t)}$: Precipitation
 - $ETP_{(t)}$: Potential ET
 - River daily discharges



1. RibAV conceptualization

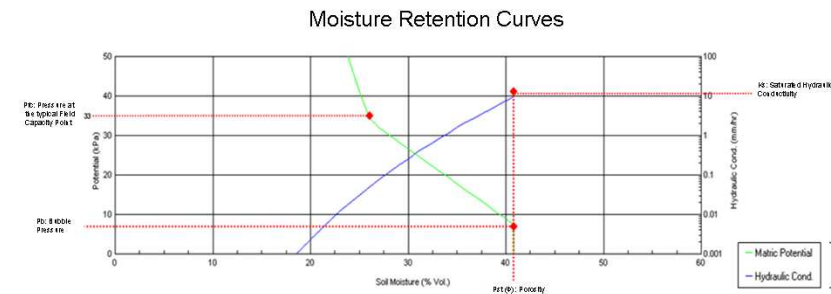
- Processes:
 - Tank Water Excess (Runoff +percolation)
 - Transpiration:
 - Saturated Soil
 - Non saturated Soil
 - Plant drowning (then $ET=0$)
 - $Acap_{(t)}$: Soil capillary rise
 - $Ahf_{(t)}$: Root hydraulic lift



2. Ribav Parameters

1. Ribav Basic Parameters

A. SOIL BASIC PARAMETERS						
SOIL Type	ϕ Porosity []	λ Porosity Index	Hb Bubble Pressure [Kpa]	Saturated Hydraulic Conductivity [mm/hr]	θ_{cc} Field Capacity Moisture at 33Kpa []	Minimum Capillary Depth to be Considered [m]
	a.2	a.5	a.4	a.3	a.1	a.7
	Pst	Ip	Pb	Ks	Mfc	ZCmin
1	0.401	0.4556	5.837	36.78	0.18	17
2	0.412	0.314	4.403	22.62	0.221	17
3	0.407	0.266	2.475	32	0.205	17
n	.....	.....	.....	.....	.....	17



B. VEGETATION BASIC PARAMETERS										
Vegetation Type	Maximum Root Depth [m]	Effective Root Depth [m]	Extinction at Saturation [m]	Transpiration Factor from Unsaturated Zone []	Transpiration Factor from Saturated Zone []	λ_v Plant Cover []	Maximum Soil-Root Water Conductance [mmMpa ⁻¹ h ⁻¹]	Wilting Point Pressure [Kpa]	Critical Point Pressure [Kpa]	Vegetation Type Description
	b.3	b.4	b.5	b.9	b.6	b.7	b.8	b.2	b.1	
	Zr	Ze	Zsat	Ri	Rj	Cov	Crt	Pwp	Pcrit	
1	0.8	0.7	-0.75	0.8	0.6	1	0.97	1500	500	Riparian Herbs (RH)
2	1.25	0.9	-0.1	0.9	0.35	0.8	0.97	1500	500	Riparian Juveniles and small Shrubs (RJ)
3	3.5	0.9	-0.3	0.9	0.35	1	0.97	1500	250	Riparian Adults Trees and Shrubs (RA)
4	2	1.9	0.3	1	0	1	0.97	1500	95	Terrestrial Vegetation (TV)

2. Other Input Parameters

C. DAILY HYDROMETEOROLOGICAL INPUTS			
Date	Daily Precipitation [mm]	Potential Evapotranspiration [mm]	Daily Flow [m ³ /s]
	c.1	c.2	c.3
	PP	ETP	Q
01/01/1999	1.700	1.174	0.791
02/01/1999	0.717	1.17	0.783
03/01/1999	0	1.192	0.718
04/01/1999	0	1.172	0.672
05/01/1999	0	1.198	0.728
06/01/1999	0	1.18	0.865
07/01/1999	0	1.182	1.145
d	.....	.....	.....

D. RATING CURVES							
Flow Transect 1	Rivel Level Transect 1	Flow Transect 2	Rivel Level Transect 2	Flow Transect 3	Rivel Level Transect 3	Flow Transect t	Rivel Level Transect t
m ³ /s	m	m ³ /s	m	m ³ /s	m	m ³ /s	m
0	228.62	0	228.59	0	228.71	.....	.....
0.001	228.65	0.001	228.62	0.001	228.74	.....	.....
0.003	228.68	0.002	228.65	0.003	228.77	.....	.....
0.005	228.71	0.003	228.68	0.005	228.8	.....	.....
0.009	228.74	0.005	228.71	0.009	228.83	.....	.....
0.014	228.77	0.008	228.74	0.014	228.86	.....	.....
0.021	228.8	0.013	228.77	0.021	228.89	.....	.....
0.031	228.83	0.019	228.8	0.031	228.92	.....	.....
0.044	228.86	0.027	228.83	0.044	228.95	.....	.....
0.061	228.89	0.037	228.86	0.061	228.98	.....	.....
0.082	228.92	0.051	228.89	0.082	229.01	.....	.....
0.107	228.95	0.068	228.92	0.108	229.04	.....	.....
0.139	228.98	0.088	228.95	0.141	229.07	.....	.....
0.176	229.01	0.113	228.98	0.179	229.1	.....	.....
0.22	229.04	0.143	229.01	0.225	229.13	.....	.....
.....
Q1	H1	Q2	H2	Q3	H3	Qt	Ht

Linear interpolation

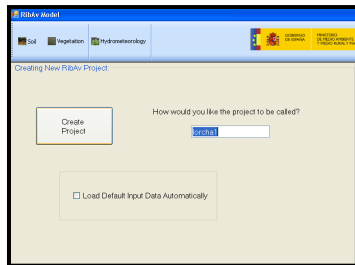
Water Table Elevation [m]
WTE
229.193
229.191
229.19
229.188
229.187
229.19
229.185
.....

2. Ribav Parameters

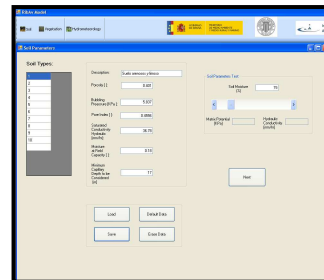
3. Example of specific data of each simulation Point

E. SIMULATION POINT DATA				
Point	Soil Surface Elevation	Soil Type	Pertaining Transect	Observed Vegetation Type
1	236.133	4	1	TV
2	232.898	4	1	TV
3	230.499	2	1	RA
4	230.697	1	1	TV
5	231.447	1	1	TV
6	232.197	1	1	TV
7	232.969	4	2	TV
8	232.219	4	2	TV
9	231.469	4	2	RA+TV
10	230.765	4	2	RA+TV
11	230.809	1	2	TV
12	231.611	1	2	TV
13	232.361	1	2	TV
14	233.135	4	3	TV
15	232.922	4	3	TV
16	232.172	4	3	RA+TV
17	230.31	4	3	RA+TV
p	.....	.....	.....	.....

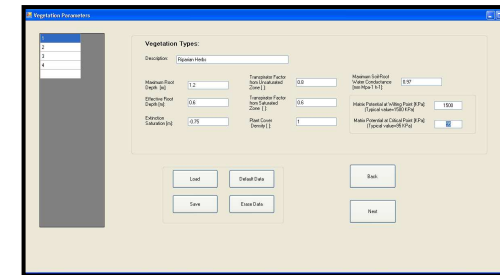
Ribav Program Forms



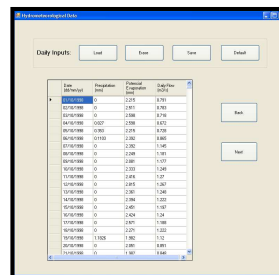
1. Main Menu



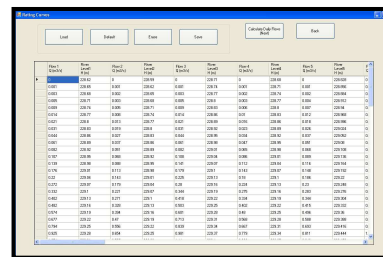
2. Soil Parameters



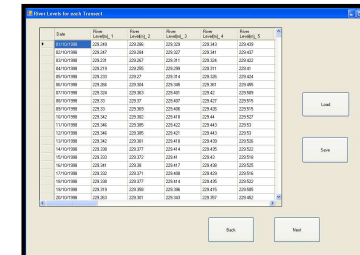
3. Vegetation Parameters



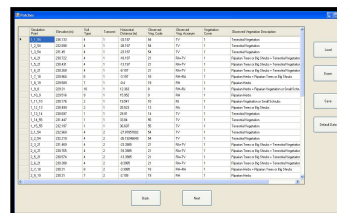
4. Hydro-meteorological Input Data



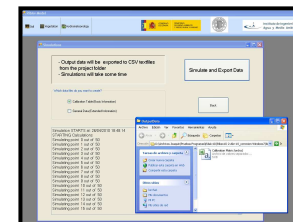
5. Rating Curves



6. Daily River Levels

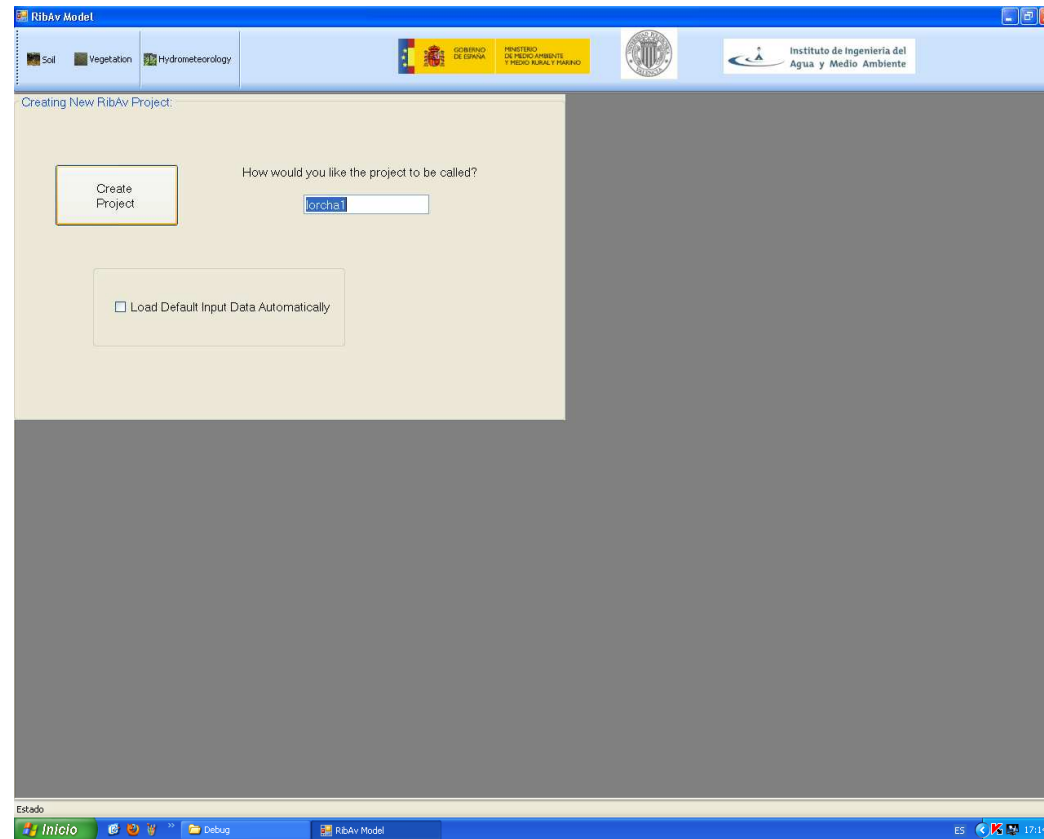


7. Simulation Point Data

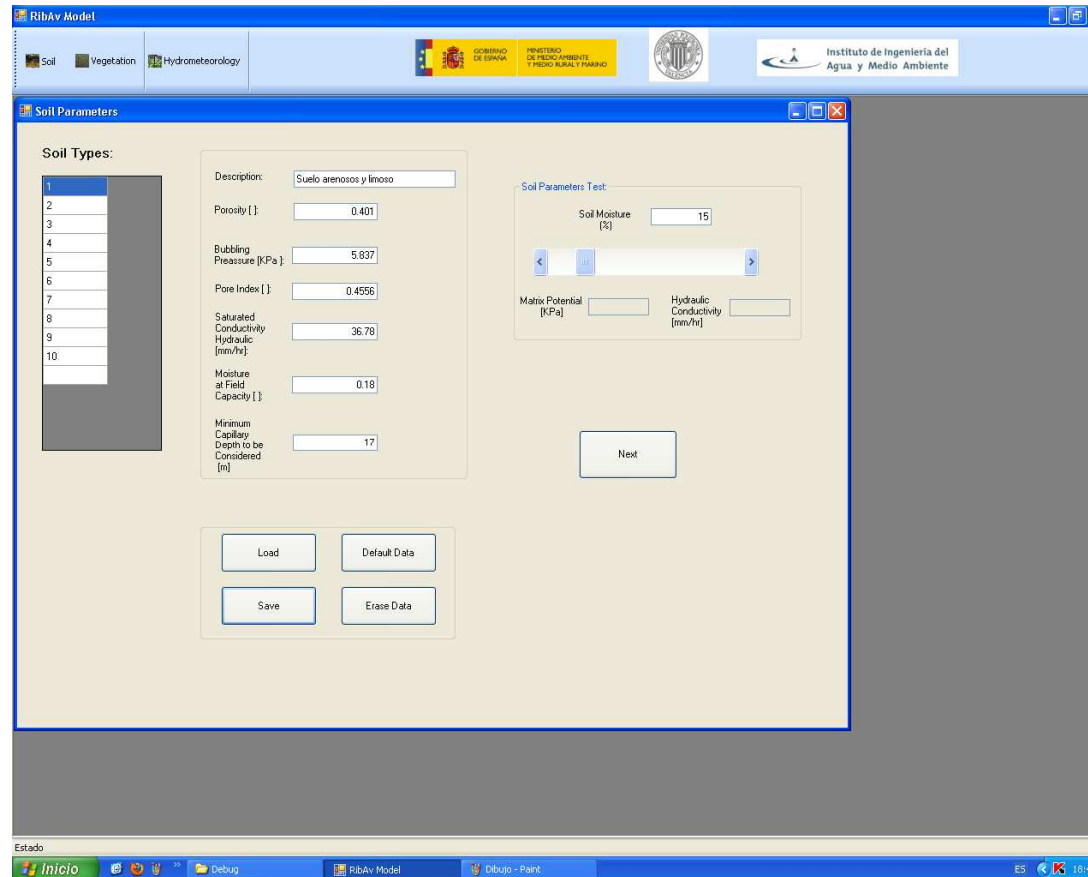


8. Simulations Results Form

1.Main Menu



2. Soil Parameters Form

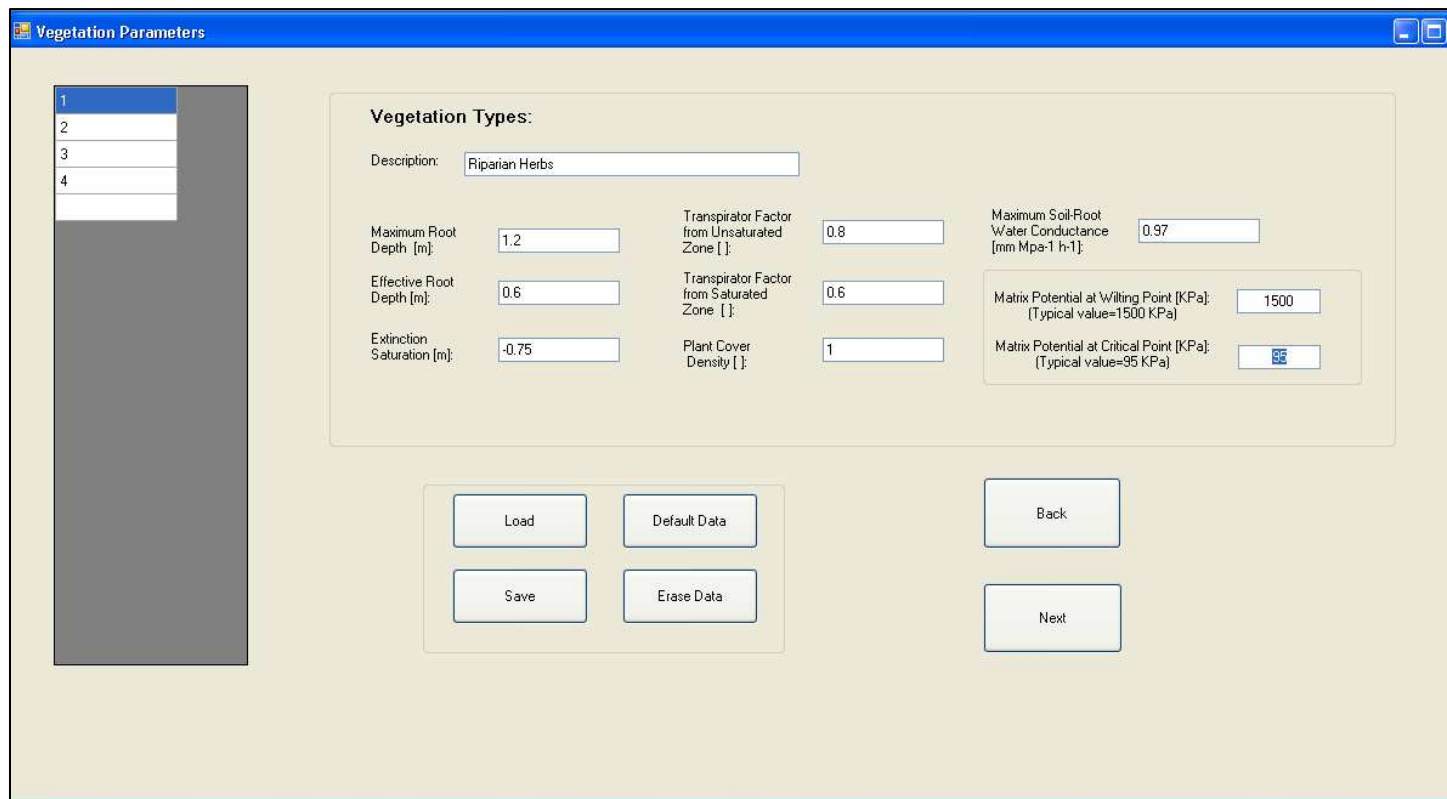


The screenshot shows the 'Soil Parameters' form within the 'Ribav Model' application. The form is divided into several sections:

- Soil Types:** A list of 10 soil types, with type 1 selected.
- Description:** A text field containing 'Suelo arenoso y limoso'.
- Porosity []:** A numeric input field with the value 0.401.
- Bubbling Pressure [kPa]:** A numeric input field with the value 5.837.
- Pore Index []:** A numeric input field with the value 0.4556.
- Saturated Conductivity Hydraulic [mm/hr]:** A numeric input field with the value 36.78.
- Moisture at Field Capacity []:** A numeric input field with the value 0.18.
- Minimum Capillary Depth to be Considered [m]:** A numeric input field with the value 17.
- Soil Parameters Test:** A section containing:
 - Soil Moisture [%]:** A numeric input field with the value 15.
 - Matrix Potential [kPa]:** An empty numeric input field.
 - Hydraulic Conductivity [mm/hr]:** An empty numeric input field.
- Buttons:** A 'Next' button is located below the test parameters. At the bottom of the form, there are four buttons: 'Load', 'Default Data', 'Save', and 'Erase Data'.

The application window title is 'Ribav Model'. The top bar includes logos for the Spanish Government, the Ministry of Agriculture, and the Institute of Water and Environmental Engineering. The Windows taskbar at the bottom shows the system tray with the time 18:43 and the language ES.

3. Vegetation Parameters Form



Vegetation Parameters

1
2
3
4

Vegetation Types:

Description: Riparian Herbs

Maximum Root Depth [m]: 1.2

Effective Root Depth [m]: 0.6

Extinction Saturation [m]: -0.75

Transpiration Factor from Unsaturated Zone []: 0.8

Transpiration Factor from Saturated Zone []: 0.6

Plant Cover Density []: 1

Maximum Soil-Root Water Conductance [mm Mpa⁻¹ h⁻¹]: 0.97

Matrix Potential at Wilting Point [KPa]: 1500
(Typical value=1500 KPa)

Matrix Potential at Critical Point [KPa]: 66
(Typical value=95 KPa)

Load Default Data Back

Save Erase Data Next

4. Hydro-meteorological Input Data

Hydrometeorological Data

Daily Inputs:

Date (dd/mm/yy)	Precipitation (mm)	Potencial Evaporation (mm)	Daily Flow (m3/s)
01/10/1998	0	2.215	0.791
02/10/1998	0	2.511	0.783
03/10/1998	0	2.598	0.718
04/10/1998	0.827	2.598	0.672
05/10/1998	0.353	2.215	0.728
06/10/1998	0.1103	2.392	0.865
07/10/1998	0	2.392	1.145
08/10/1998	0	2.249	1.181
09/10/1998	0	2.081	1.177
10/10/1998	0	2.333	1.249
11/10/1998	0	2.416	1.27
12/10/1998	0	2.815	1.267
13/10/1998	0	2.361	1.248
14/10/1998	0	2.394	1.222
15/10/1998	0	2.451	1.197
16/10/1998	0	2.424	1.24
17/10/1998	0	2.571	1.188
18/10/1998	0	2.271	1.222
19/10/1998	1.1826	1.982	1.12
20/10/1998	0	2.051	0.851
21/10/1998	0	1.982	0.848

5. Rating Curves

Rating Curves

Flow 1 Q (m ³ /s)	River Level1 H (m)	Flow 2 Q (m ³ /s)	River Level2 H (m)	Flow 3 Q (m ³ /s)	River Level3 H (m)	Flow 4 Q (m ³ /s)	River Level4 H (m)	Flow 5 Q (m ³ /s)	River Level5 H (m)	F C
0	228.62	0	228.59	0	228.71	0	228.68	0	228.828	0
0.001	228.65	0.001	228.62	0.001	228.74	0.001	228.71	0.001	228.856	0
0.003	228.68	0.002	228.65	0.003	228.77	0.002	228.74	0.002	228.884	0
0.005	228.71	0.003	228.68	0.005	228.8	0.003	228.77	0.004	228.912	0
0.009	228.74	0.005	228.71	0.009	228.83	0.006	228.8	0.007	228.94	0
0.014	228.77	0.008	228.74	0.014	228.86	0.01	228.83	0.012	228.968	0
0.021	228.8	0.013	228.77	0.021	228.89	0.016	228.86	0.018	228.996	0
0.031	228.83	0.019	228.8	0.031	228.92	0.023	228.89	0.026	229.024	0
0.044	228.86	0.027	228.83	0.044	228.95	0.034	228.92	0.037	229.052	0
0.061	228.89	0.037	228.86	0.061	228.98	0.047	228.95	0.051	229.08	0
0.082	228.92	0.051	228.89	0.082	229.01	0.065	228.98	0.068	229.108	0
0.107	228.95	0.068	228.92	0.108	229.04	0.086	229.01	0.089	229.136	0
0.139	228.98	0.088	228.95	0.141	229.07	0.112	229.04	0.116	229.164	0
0.176	229.01	0.113	228.98	0.179	229.1	0.143	229.07	0.148	229.192	0
0.22	229.04	0.143	229.01	0.225	229.13	0.18	229.1	0.186	229.22	0
0.272	229.07	0.179	229.04	0.28	229.16	0.224	229.13	0.23	229.248	0
0.332	229.1	0.221	229.07	0.344	229.19	0.275	229.16	0.283	229.276	0
0.402	229.13	0.271	229.1	0.418	229.22	0.334	229.19	0.344	229.304	0
0.482	229.16	0.328	229.13	0.503	229.25	0.402	229.22	0.415	229.332	0
0.574	229.19	0.394	229.16	0.601	229.28	0.48	229.25	0.496	229.36	0
0.677	229.22	0.47	229.19	0.713	229.31	0.568	229.28	0.588	229.388	0
0.794	229.25	0.556	229.22	0.839	229.34	0.667	229.31	0.693	229.416	0
0.925	229.28	0.654	229.25	0.981	229.37	0.779	229.34	0.811	229.444	1

6. Daily River Levels

River Levels for each Transect

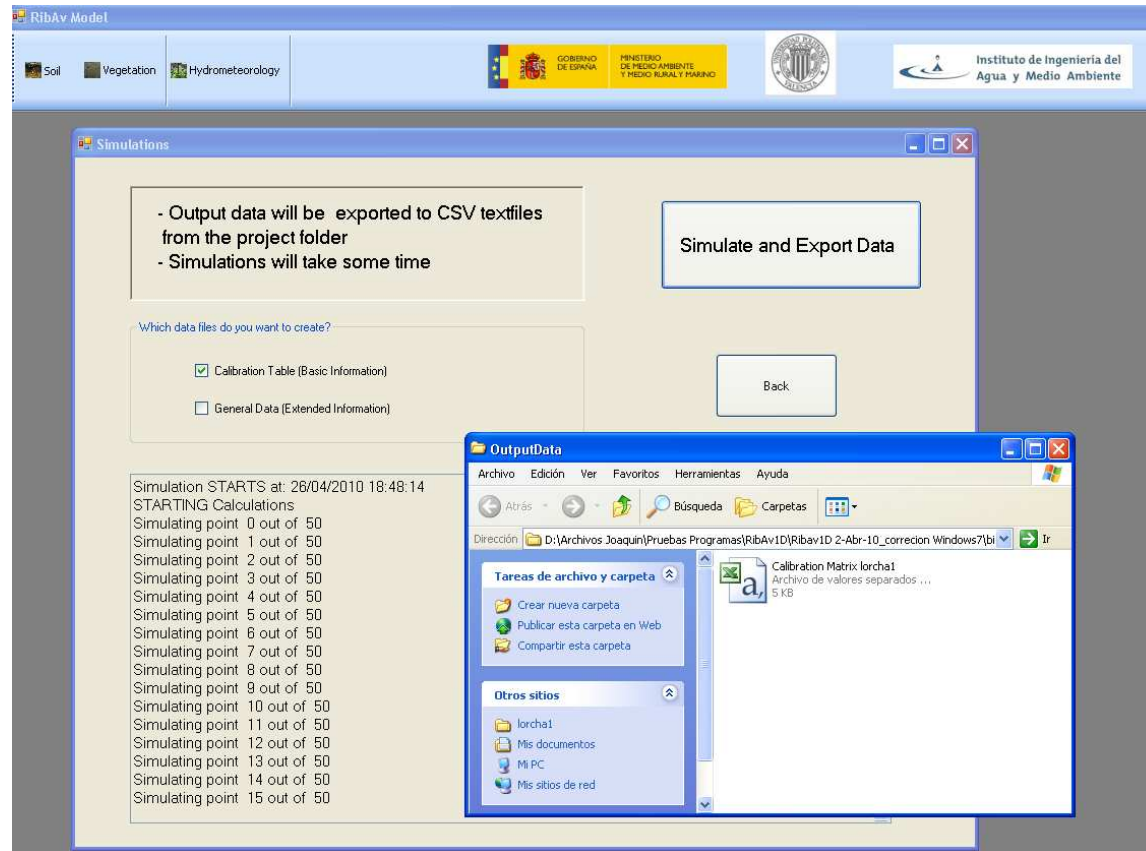
Date	River Level(m)_1	River Level(m)_2	River Level(m)_3	River Level(m)_4	River Level(m)_5
01/10/1998	229.249	229.286	229.329	229.343	229.439
02/10/1998	229.247	229.284	229.327	229.341	229.437
03/10/1998	229.231	229.267	229.311	229.324	229.422
04/10/1998	229.219	229.255	229.299	229.311	229.41
05/10/1998	229.233	229.27	229.314	229.326	229.424
06/10/1998	229.266	229.304	229.345	229.361	229.455
07/10/1998	229.324	229.363	229.401	229.42	229.509
08/10/1998	229.33	229.37	229.407	229.427	229.515
09/10/1998	229.33	229.369	229.406	229.426	229.515
10/10/1998	229.342	229.382	229.418	229.44	229.527
11/10/1998	229.346	229.385	229.422	229.443	229.53
12/10/1998	229.346	229.385	229.421	229.443	229.53
13/10/1998	229.342	229.381	229.418	229.439	229.526
14/10/1998	229.338	229.377	229.414	229.435	229.522
15/10/1998	229.333	229.372	229.41	229.43	229.518
16/10/1998	229.341	229.38	229.417	229.438	229.525
17/10/1998	229.332	229.371	229.408	229.429	229.516
18/10/1998	229.338	229.377	229.414	229.435	229.522
19/10/1998	229.319	229.358	229.396	229.415	229.505
20/10/1998	229.263	229.301	229.343	229.357	229.452

Buttons: Load, Save, Back, Next

7. Simulation Point Data

Simulation Point	Elevation (m)	Soil Type	Transect	Horizontal Distance (m)	Observed Veg. Code	Observed Veg. Acronym	Vegetation Cover	Observed Vegetation Description
1_1_54	236.133	4	1	-33.197	54	TV	1	Terrestrial Vegetation
1_2_54	232.898	4	1	-28.197	54	TV	1	Terrestrial Vegetation
1_3_54	231.45	4	1	-23.197	54	TV	1	Terrestrial Vegetation
1_4_21	230.722	4	1	-18.197	21	RA+TV	1	Riparian Trees or Big Shrubs + Terrestrial Vegetation
1_5_21	230.431	4	1	-13.197	21	RA+TV	1	Riparian Trees or Big Shrubs + Terrestrial Vegetation
1_6_21	230.268	4	1	-8.197	21	RA+TV	1	Riparian Trees or Big Shrubs + Terrestrial Vegetation
1_7_18	229.964	8	1	-3.197	18	RH+RA	1	Riparian Herbs + Riparian Trees or Big Shrubs
1_8_19	229.589	7	1	-0.4	19	RH	1	Riparian Herbs
1_9_8	229.31	10	1	12.363	8	RH+RJ	1	Riparian Herbs + Riparian Vegetation or Small Shrubs
1_10_9	229.516	9	1	15.952	9	RH	1	Riparian Herbs
1_11_10	230.176	2	1	19.541	10	RJ	1	Riparian Vegetation or Small Shrubs
1_12_13	230.499	2	1	25.523	13	RA	1	Riparian Trees or Big Shrubs
1_13_14	230.697	1	1	29.91	14	TV	1	Terrestrial Vegetation
1_14_55	231.447	1	1	33.84	55	TV	1	Terrestrial Vegetation
1_15_55	232.197	1	1	36.607	55	TV	1	Terrestrial Vegetation
2_1_54	232.969	4	2	-27.87857002	54	TV	1	Terrestrial Vegetation
2_2_54	232.219	4	2	-26.19246649	54	TV	1	Terrestrial Vegetation
2_3_21	231.469	4	2	-23.3985	21	RA+TV	1	Riparian Trees or Big Shrubs + Terrestrial Vegetation
2_4_21	230.765	4	2	-18.3985	21	RA+TV	1	Riparian Trees or Big Shrubs + Terrestrial Vegetation
2_5_21	230.574	4	2	-13.3985	21	RA+TV	1	Riparian Trees or Big Shrubs + Terrestrial Vegetation
2_6_21	230.388	4	2	-8.3985	21	RA+TV	1	Riparian Trees or Big Shrubs + Terrestrial Vegetation
2_7_18	230.31	8	2	-3.3985	18	RH+RA	1	Riparian Herbs + Riparian Trees or Big Shrubs
2_8_19	230.31	7	2	-2.199	19	RH	1	Riparian Herbs

8. Simulations Results Form



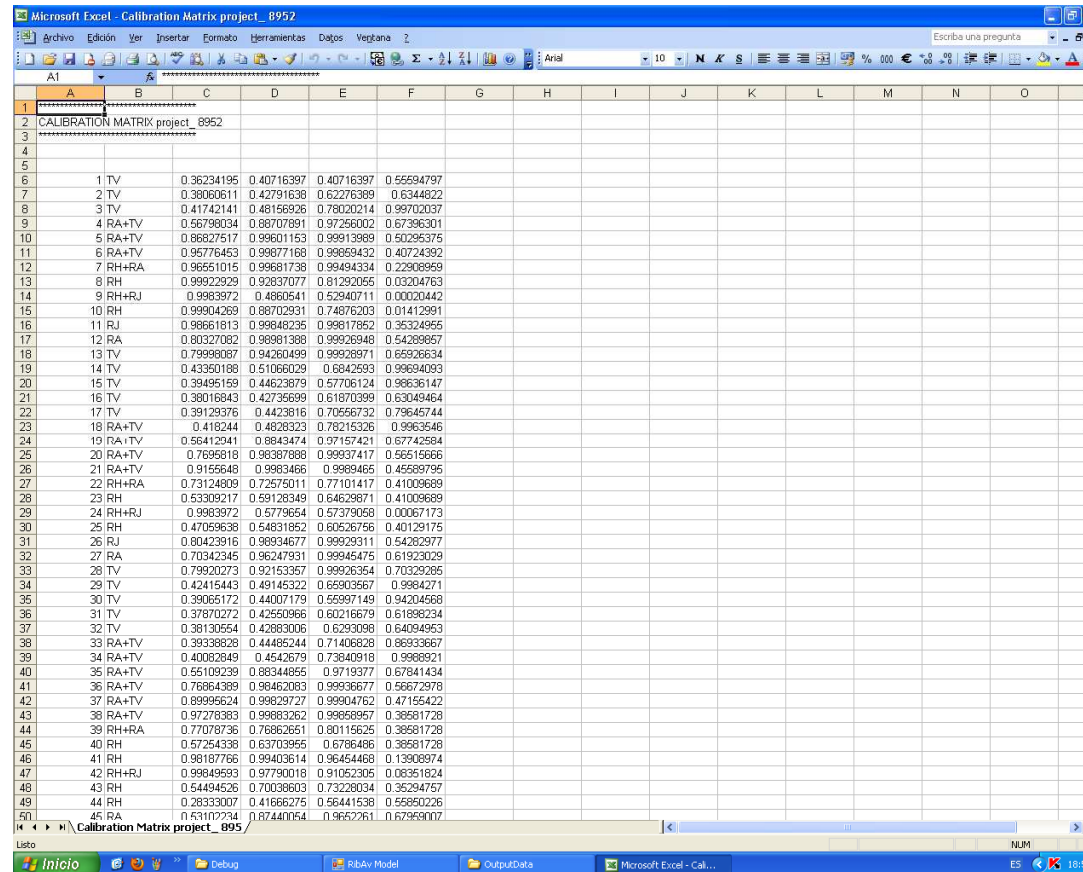
The screenshot displays the RibAv Model software interface. The main window is titled "Simulations" and contains the following elements:

- Buttons for "Soil", "Vegetation", and "Hydrometeorology" at the top left.
- Logos for the Spanish Government (GOBIERNO DE ESPAÑA), the Ministry of Environment and Rural Affairs (MINISTERIO DE MEDIO AMBIENTE Y MEDIO RURAL Y MARINO), and the Instituto de Ingeniería del Agua y Medio Ambiente at the top right.
- Instructions: "Output data will be exported to CSV textfiles from the project folder" and "Simulations will take some time".
- A "Simulate and Export Data" button.
- A "Back" button.
- A section titled "Which data files do you want to create?" with two checkboxes:
 - Calibration Table (Basic Information)
 - General Data (Extended Information)
- A log window at the bottom left showing simulation progress:

```
Simulation STARTS at: 26/04/2010 18:48:14
STARTING Calculations
Simulating point 0 out of 50
Simulating point 1 out of 50
Simulating point 2 out of 50
Simulating point 3 out of 50
Simulating point 4 out of 50
Simulating point 5 out of 50
Simulating point 6 out of 50
Simulating point 7 out of 50
Simulating point 8 out of 50
Simulating point 9 out of 50
Simulating point 10 out of 50
Simulating point 11 out of 50
Simulating point 12 out of 50
Simulating point 13 out of 50
Simulating point 14 out of 50
Simulating point 15 out of 50
```

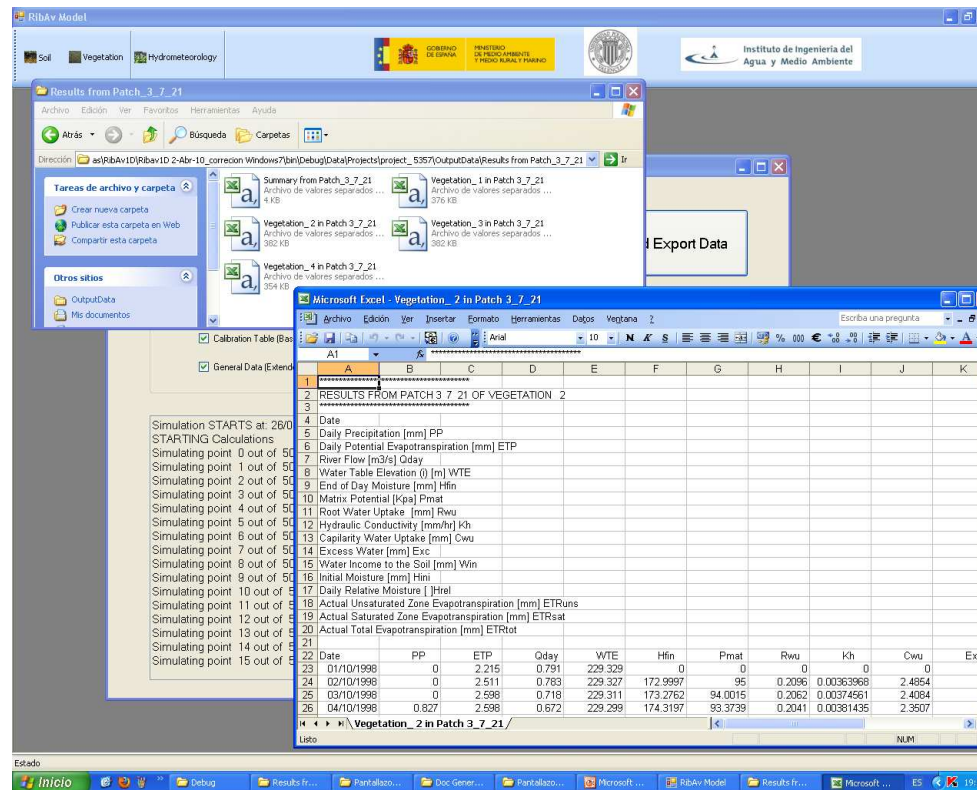
An "OutputData" window is open in the foreground, showing a file explorer view of the directory "D:\Archivos Joaquin\Pruebas Programas\RibAv1D\RibAv1D 2-Abr-10_correccion Windows7\bi". It displays a file named "Calibration Matrix: lorcha1" with a size of 5 KB.

9.a. Calibration Table (Basic Information)



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2	CALIBRATION MATRIX project_8952														
3															
4															
5															
6	1 TV	0.36234195	0.40716397	0.40716397	0.55594797										
7	2 TV	0.38060611	0.42791638	0.62276389	0.63446222										
8	3 TV	0.41742141	0.48156926	0.78020214	0.99702037										
9	4 RA+TV	0.56790034	0.86707891	0.97256002	0.67396301										
10	5 RA+TV	0.86827517	0.99601153	0.99913989	0.50295375										
11	6 RA+TV	0.95776453	0.99877168	0.99869432	0.40724392										
12	7 RH+RA	0.96551015	0.99681738	0.99494334	0.22908959										
13	8 RH	0.99922929	0.92837077	0.81292055	0.03204763										
14	9 RH+RJ	0.9983972	0.4860541	0.52940711	0.00020442										
15	10 RH	0.99904269	0.86702931	0.74676203	0.01412891										
16	11 RJ	0.99618113	0.99849235	0.99817952	0.35324955										
17	12 RA	0.80327082	0.96981398	0.99026948	0.54263967										
18	13 TV	0.79998087	0.94260499	0.99928971	0.65928634										
19	14 TV	0.43350188	0.51066029	0.6842593	0.99694093										
20	15 TV	0.39495159	0.44623879	0.57706124	0.98636147										
21	16 TV	0.38016843	0.42735699	0.61870399	0.63049464										
22	17 TV	0.39129376	0.4423816	0.70566732	0.79645744										
23	18 RA+TV	0.418244	0.4828323	0.78215326	0.9963546										
24	19 RA+TV	0.56412941	0.8843474	0.97157421	0.67742584										
25	20 RA+TV	0.7696818	0.96387888	0.9937417	0.56515666										
26	21 RA+TV	0.9155648	0.9983486	0.9989465	0.45589795										
27	22 RH+RA	0.73124809	0.72575011	0.77101417	0.41009689										
28	23 RH	0.63309217	0.59128349	0.64629871	0.41009689										
29	24 RH+RJ	0.9983972	0.5779654	0.57379058	0.00067173										
30	25 RH	0.47059638	0.54831852	0.60526756	0.40129175										
31	26 RJ	0.80423916	0.98934677	0.99929311	0.54282977										
32	27 RA	0.70342345	0.96247931	0.99945475	0.61923029										
33	28 TV	0.79920273	0.92153357	0.99926354	0.70329285										
34	29 TV	0.42415443	0.49145322	0.65903567	0.9984271										
35	30 TV	0.39065172	0.44007179	0.55997149	0.94204568										
36	31 TV	0.37870272	0.42550966	0.60216679	0.61898234										
37	32 TV	0.38130554	0.42883006	0.6293098	0.64094953										
38	33 RA+TV	0.39338828	0.44485244	0.71408828	0.96933657										
39	34 RA+TV	0.40080949	0.4542679	0.73849518	0.9898921										
40	35 RA+TV	0.55109239	0.88344855	0.9719377	0.67841434										
41	36 RA+TV	0.76864389	0.96462083	0.99936677	0.56672978										
42	37 RA+TV	0.8995624	0.99829727	0.99904762	0.47155422										
43	38 RA+TV	0.97278383	0.99883262	0.99858957	0.38581728										
44	39 RH+RA	0.77078736	0.76862651	0.80115625	0.38581728										
45	40 RH	0.57254338	0.63703955	0.6786486	0.38581728										
46	41 RH	0.98187766	0.99403614	0.96454468	0.13908974										
47	42 RH+RJ	0.99849593	0.97790018	0.91052305	0.08351824										
48	43 RH	0.54494526	0.70038603	0.73228034	0.35294757										
49	44 RH	0.26333007	0.41666275	0.56441538	0.55980226										
50	45 RA	0.53102744	0.87440054	0.9657261	0.67959007										

9.b General Data for a given simulation point for a given vegetation type



The screenshot displays the RibAv Model software interface. The main window shows a list of simulation results for Patch 3_7_21, including files for Summary, Vegetation_1, Vegetation_2, and Vegetation_3. An Excel spreadsheet titled 'Vegetation_2 in Patch 3_7_21' is open, showing a table of simulation results. The table includes columns for Date, Daily Precipitation (PP), Daily Potential Evapotranspiration (ETP), River Flow (Qday), Water Table Elevation (WTE), End of Day Moisture (Hfin), Matrix Potential (Pmat), Root Water Uptake (Rwu), Hydraulic Conductivity (Kh), Capillary Water Uptake (Cwu), Excess Water (Exc), Water Income to the Soil (Win), Initial Moisture (Hini), Daily Relative Humidity (Hrel), Actual Unsaturated Zone Evapotranspiration (ETRuns), Actual Saturated Zone Evapotranspiration (ETRsat), and Actual Total Evapotranspiration (ETRtot).

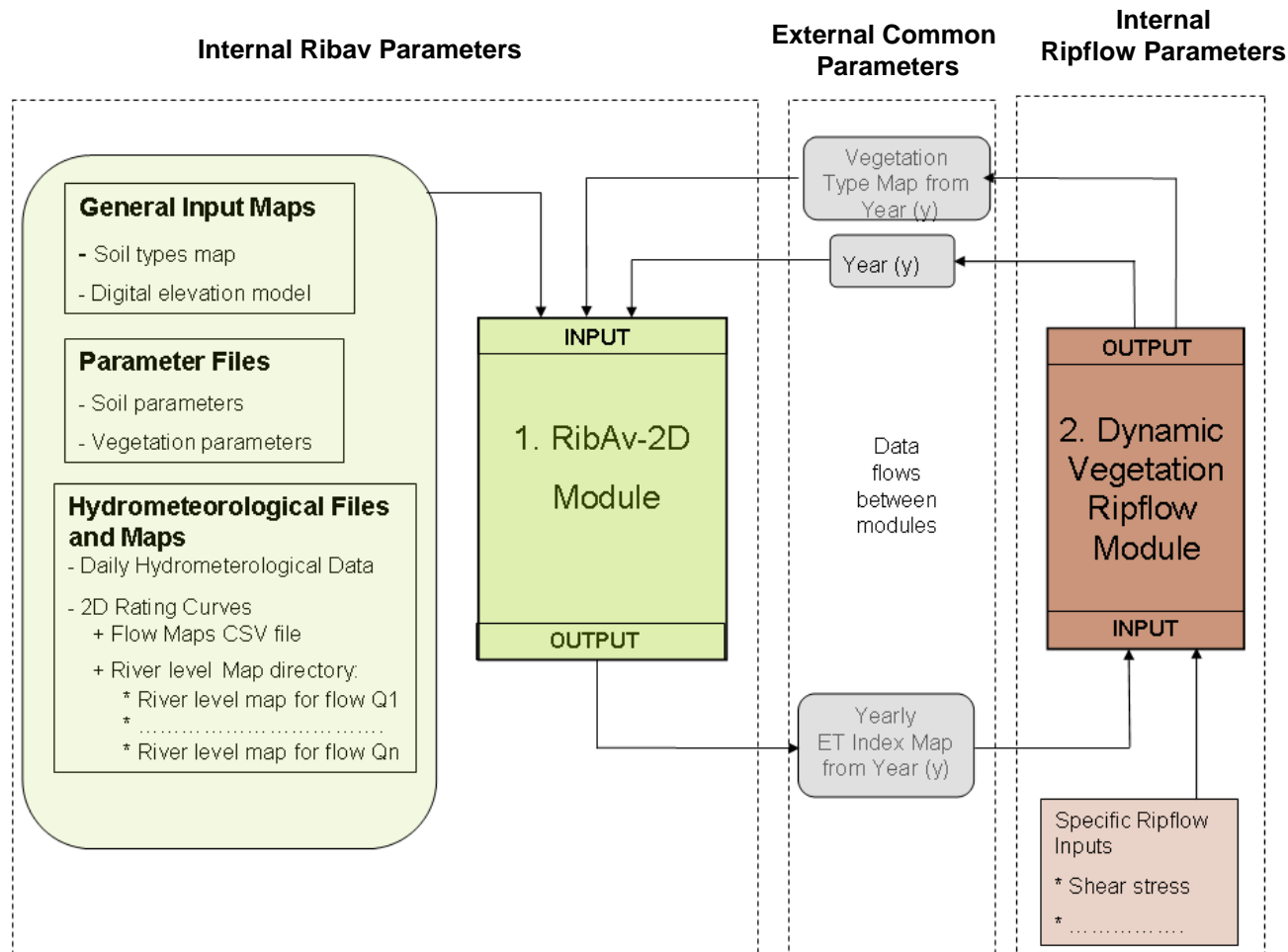
Date	PP	ETP	Qday	WTE	Hfin	Pmat	Rwu	Kh	Cwu	Exc
01/10/1998	0	2.215	0.791	229.329	0	0	0	0	0	0
02/10/1998	0	2.511	0.783	229.327	172.9997	95	0.2096	0.00363968	2.4864	
03/10/1998	0	2.598	0.718	229.311	173.2762	94.0015	0.2062	0.00374561	2.4684	
04/10/1998	0.827	2.598	0.672	229.299	174.5197	93.3739	0.2041	0.00381435	2.3507	

1. General Characteristics of Ribav 2D

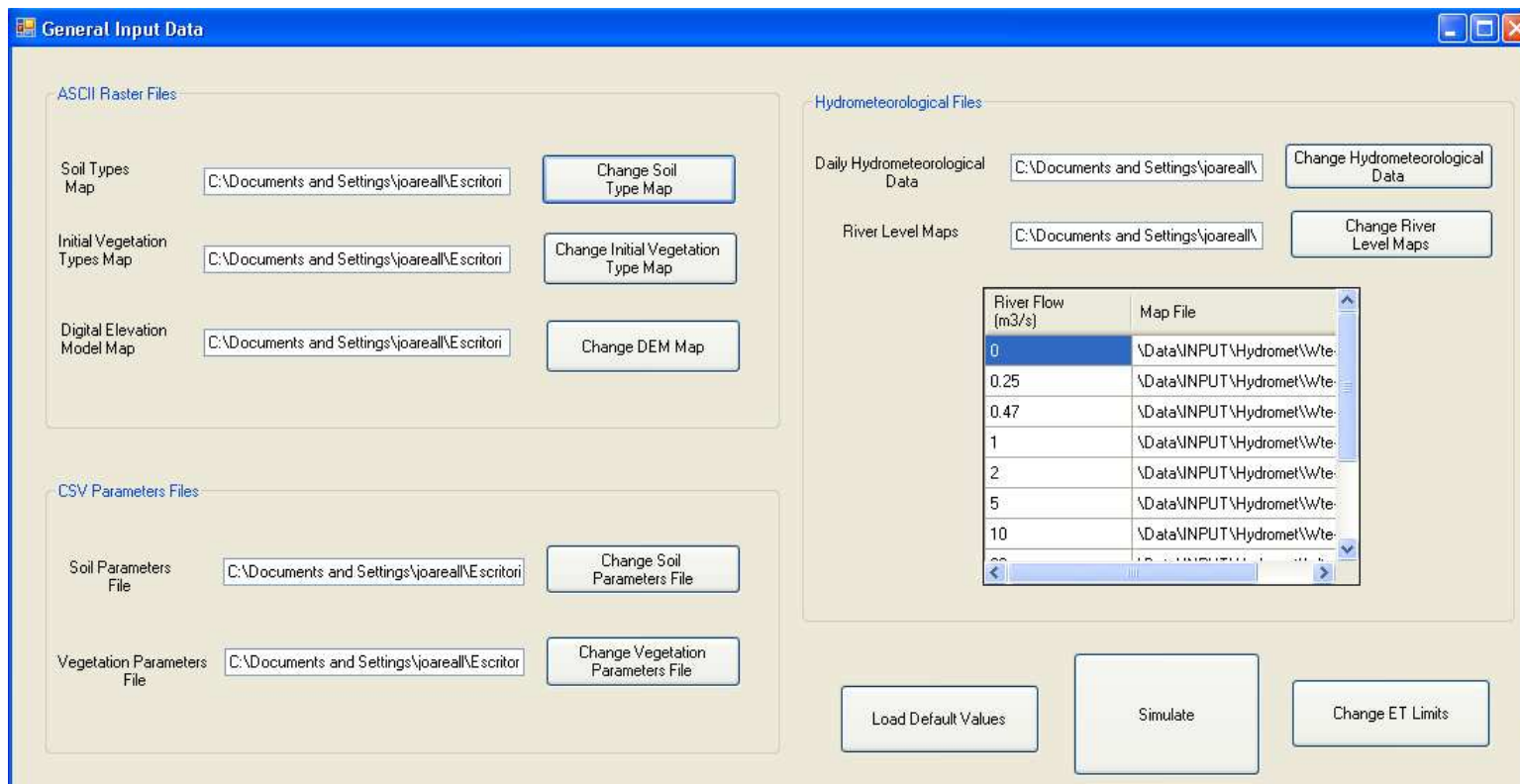
Although the mathematical model conceptualization is the same as in Ribav 1D, It uses raster grids instead of using simulation points.

- It requires a greater quantity of data than Ribav 1D and it takes more time to carry out the simulations.
- It is able to integrate within Ripflow.

2. Internal and External Ribav Parameters



2. General Input Data



General Input Data

ASCII Raster Files

- Soil Types Map: C:\Documents and Settings\joareal\Escritori
- Initial Vegetation Types Map: C:\Documents and Settings\joareal\Escritori
- Digital Elevation Model Map: C:\Documents and Settings\joareal\Escritori

CSV Parameters Files

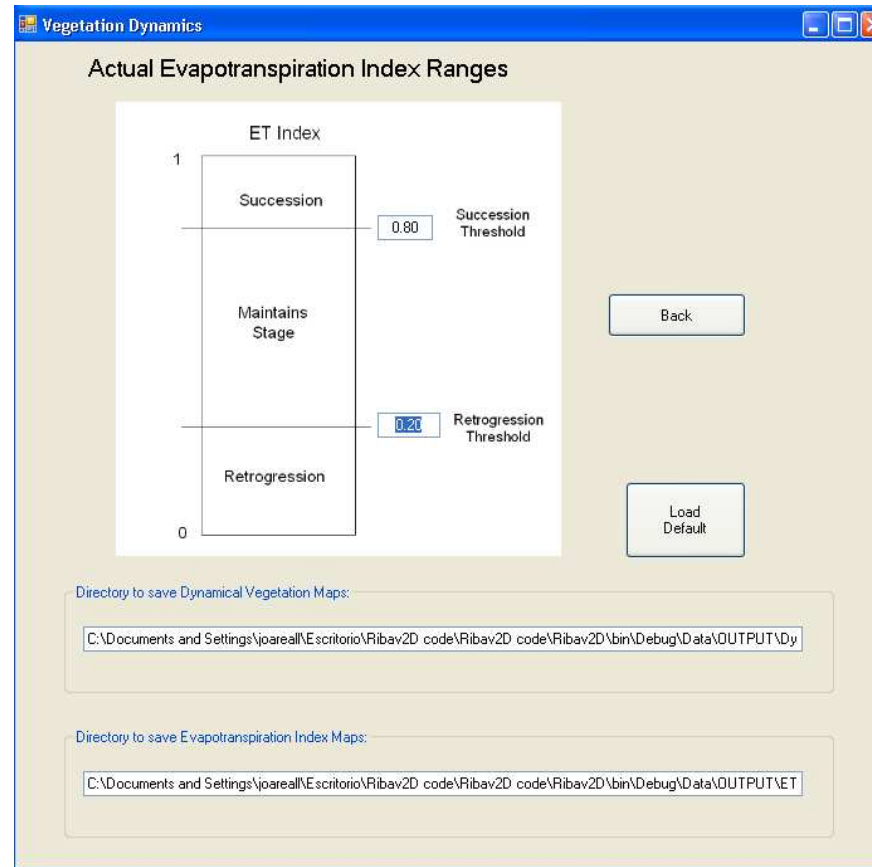
- Soil Parameters File: C:\Documents and Settings\joareal\Escritori
- Vegetation Parameters File: C:\Documents and Settings\joareal\Escritori

Hydrometeorological Files

- Daily Hydrometeorological Data: C:\Documents and Settings\joareal\
- River Level Maps: C:\Documents and Settings\joareal\

River Flow (m3/s)	Map File
0	\Data\INPUT\Hydromet\Wte
0.25	\Data\INPUT\Hydromet\Wte
0.47	\Data\INPUT\Hydromet\Wte
1	\Data\INPUT\Hydromet\Wte
2	\Data\INPUT\Hydromet\Wte
5	\Data\INPUT\Hydromet\Wte
10	\Data\INPUT\Hydromet\Wte

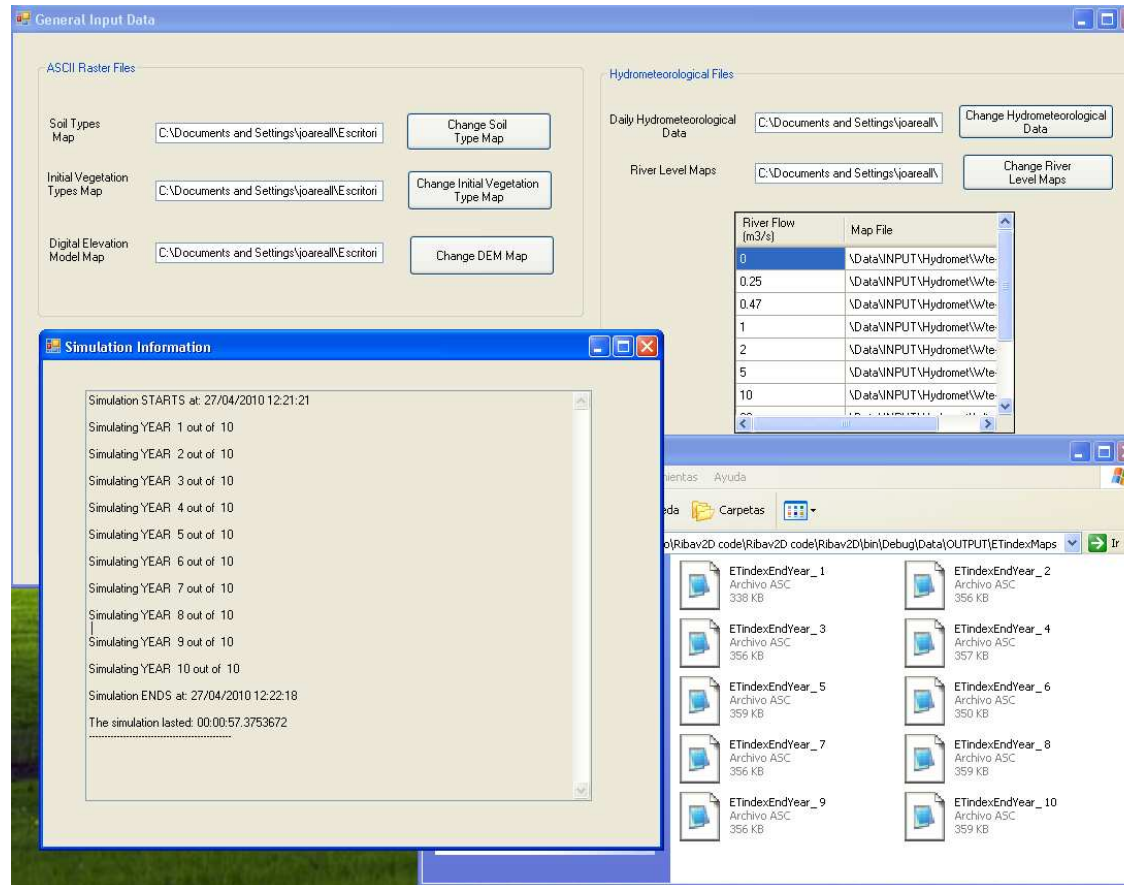
3. Vegetation Dynamics



The screenshot shows a software window titled "Vegetation Dynamics" with a sub-header "Actual Evapotranspiration Index Ranges". The main content area features a vertical axis labeled "ET Index" ranging from 0 to 1. Three stages are defined along this axis: "Succession" (top), "Maintains Stage" (middle), and "Retgression" (bottom). A "Succession Threshold" is set at 0.80, and a "Retgression Threshold" is set at 0.20. To the right of the diagram are two buttons: "Back" and "Load Default". Below the diagram, there are two text input fields for saving maps:

- Directory to save Dynamical Vegetation Maps:
`C:\Documents and Settings\joareal\Escritorio\Ribav2D code\Ribav2D code\Ribav2D\bin\Debug\Data\OUTPUT\Dy`
- Directory to save Evapotranspiration Index Maps:
`C:\Documents and Settings\joareal\Escritorio\Ribav2D code\Ribav2D code\Ribav2D\bin\Debug\Data\OUTPUT\ET`

4. Simulation Screens



The screenshot displays the 'General Input Data' window of the Ribav 2D software. It is divided into two main sections: 'ASCII Raster Files' and 'Hydrometeorological Files'.

ASCII Raster Files:

- Soil Types Map: C:\Documents and Settings\joareal\Escritori (Change Soil Type Map)
- Initial Vegetation Types Map: C:\Documents and Settings\joareal\Escritori (Change Initial Vegetation Type Map)
- Digital Elevation Model Map: C:\Documents and Settings\joareal\Escritori (Change DEM Map)

Hydrometeorological Files:

- Daily Hydrometeorological Data: C:\Documents and Settings\joareal\ (Change Hydrometeorological Data)
- River Level Maps: C:\Documents and Settings\joareal\ (Change River Level Maps)

A table lists the River Flow (m³/s) and corresponding Map File for various flow rates:

River Flow (m ³ /s)	Map File
0	\Data\INPUT\Hydromet\Wte
0.25	\Data\INPUT\Hydromet\Wte
0.47	\Data\INPUT\Hydromet\Wte
1	\Data\INPUT\Hydromet\Wte
2	\Data\INPUT\Hydromet\Wte
5	\Data\INPUT\Hydromet\Wte
10	\Data\INPUT\Hydromet\Wte

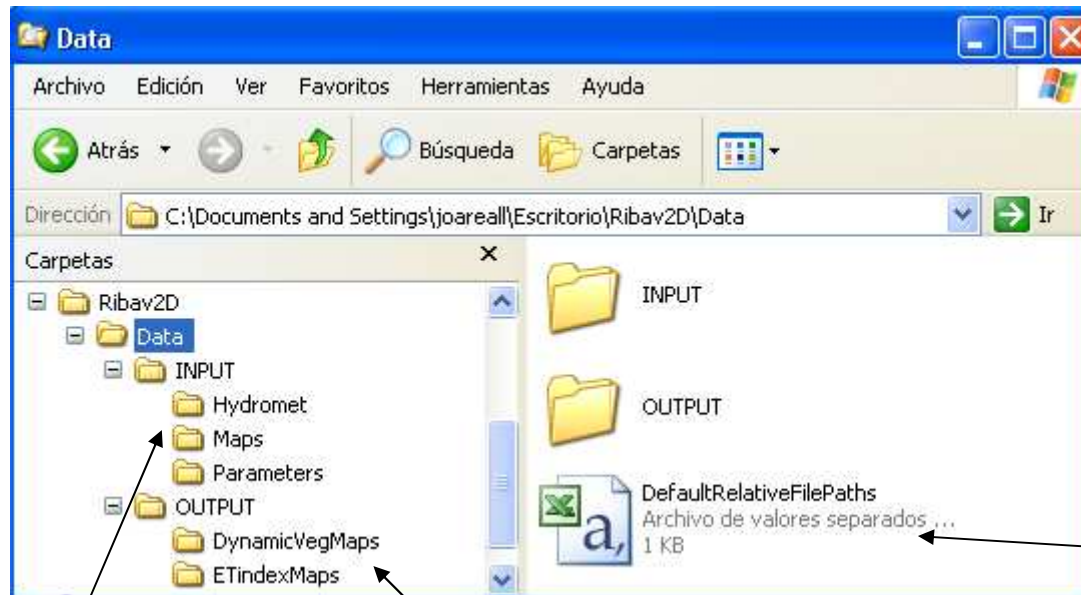
An overlaid 'Simulation Information' window shows the following details:

```

Simulation STARTS at: 27/04/2010 12:21:21
Simulating YEAR 1 out of 10
Simulating YEAR 2 out of 10
Simulating YEAR 3 out of 10
Simulating YEAR 4 out of 10
Simulating YEAR 5 out of 10
Simulating YEAR 6 out of 10
Simulating YEAR 7 out of 10
Simulating YEAR 8 out of 10
Simulating YEAR 9 out of 10
Simulating YEAR 10 out of 10
Simulation ENDS at: 27/04/2010 12:22:18
The simulation lasted: 00:00:57.3753672
    
```

A file explorer window shows the output directory: 'D:\Ribav2D code\Ribav2D code\Ribav2D\bin\Debug\Data\OUTPUT\ETindex\Maps'. It contains ten files named 'ETIndexEndYear_1' through 'ETIndexEndYear_10', all in 'Archivo ASC' format with sizes ranging from 338 KB to 359 KB.

5. Directory Structure of Ribav 2D



This file points out to the paths of the input files that are going to appear as **Default**

Input files required for the simulation

Output files created by the simulation

```

DefaultRelativeFilePaths - Bloc de notas
Archivo Edición Formato Ver Ayuda
\\Data\INPUT\Maps\SoilMap.asc
\\Data\INPUT\Maps\InitialVegetationMap.asc
\\Data\INPUT\Maps\DemMap.asc
\\Data\INPUT\Parameters\SoilParameters.csv
\\Data\INPUT\Parameters\VegetationParameters.csv
\\Data\INPUT\Hydromet\Hydromet.csv
\\Data\INPUT\Hydromet\wteMaps.csv
\\Data\OUTPUT\ETIndexMaps\
\\Data\OUTPUT\dynamicvegMaps\
    
```

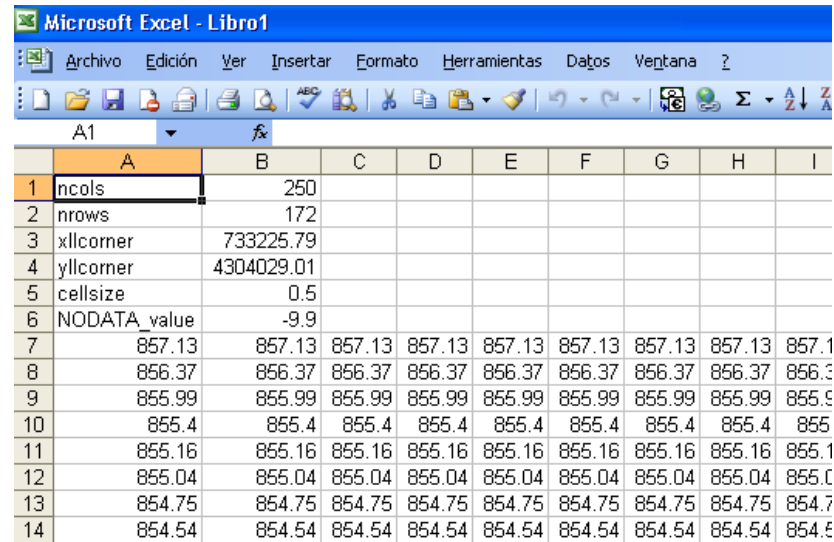

6. Internal structure for the Ribav2D files

Types of files:

- ASCII files → I/O **maps**
- CSV files → Parameters (soil and vegetation)
 - Hydrometeorological series
 - File Paths

All files in the Ribav 2D module have a **relative path** (from the Ribav executable) to make more easy integration with RIPFLOW.

6.1 ASCII Map files



	A	B	C	D	E	F	G	H	I
1	ncols	250							
2	nrows	172							
3	xllcorner	733225.79							
4	yllcorner	4304029.01							
5	cellsize	0.5							
6	NODATA_value	-9.9							
7	857.13	857.13	857.13	857.13	857.13	857.13	857.13	857.13	857.13
8	856.37	856.37	856.37	856.37	856.37	856.37	856.37	856.37	856.37
9	855.99	855.99	855.99	855.99	855.99	855.99	855.99	855.99	855.99
10	855.4	855.4	855.4	855.4	855.4	855.4	855.4	855.4	855.4
11	855.16	855.16	855.16	855.16	855.16	855.16	855.16	855.16	855.16
12	855.04	855.04	855.04	855.04	855.04	855.04	855.04	855.04	855.04
13	854.75	854.75	854.75	854.75	854.75	854.75	854.75	854.75	854.75
14	854.54	854.54	854.54	854.54	854.54	854.54	854.54	854.54	854.54

Example of a Digital Elevation input file in ASCII format

Ncols: Number of columns in Map

Nrows: Number of rows in Map

Xllcorner: X coordinate of the bottom(south)- left(west) corner

Yllcorner: Y coordinate of the bottom(south)- left(west) corner

Cellsize: dimensions of the square cells

NODATA_value: value of the cells that are irrelevant and do not take part in the simulation

6.2 CSV File

Soil parameters

Key; Porosity; Porosity Index; Bubble Pressure; Saturated Conductivity; Field Capacity Moisture; Minimum Capillary Depth; Soil Description

Soil Type

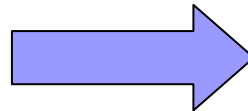
```
SoilParameters - Bloc de notas
Archivo Edición Formato Ver Ayuda
1; 0.397; 0.530167165; 3.8475892; 56.24; 0.131; 15; suelo 1
2; 0.436; 0.208469336; 0.341722491; 22.65; 0.168; 15; suelo 2
3; 0.441; 0.225872182; 2.625401278; 19.91; 0.247; 15; suelo 3
4; 0.406; 0.277030515; 1.036884215; 42.76; 0.154; 15; suelo 4
5; 0.412; 0.22005783; 0.056949035; 28.19; 0.102; 15; suelo 5
6; 0.432; 0.183539035; 0.245762728; 37.09; 0.174; 15; suelo 6
7; 0.414; 0.251033223; 0.023664714; 97.96; 0.069; 15; suelo 7
8; 0.435; 0.238123083; 0.983633766; 40.39; 0.189; 15; suelo 8
9; 0.398; 0.278307418; 2.370330035; 26.83; 0.19; 15; suelo 9
10; 0.403; 0.206462167; 0.044614143; 25.06; 0.104; 15; suelo 10
```

Another example of CSV file → Flow-WTE File Map

```

WteMaps - Bloc de notas
Archivo Edición Formato Ver Ayuda
0; \Data\INPUT\Hydromet\wte-q0.asc
0.25; \Data\INPUT\Hydromet\wte-q0,25.asc
0.47; \Data\INPUT\Hydromet\wte-q0,47.asc
1; \Data\INPUT\Hydromet\wte-q1.asc
2; \Data\INPUT\Hydromet\wte-q2.asc
5; \Data\INPUT\Hydromet\wte-q5.asc
10; \Data\INPUT\Hydromet\wte-q10.asc
30; \Data\INPUT\Hydromet\wte-q30.asc
100; \Data\INPUT\Hydromet\wte-q100.asc
300; \Data\INPUT\Hydromet\wte-q300.asc
650; \Data\INPUT\Hydromet\wte-q650.asc
    
```

Program reads the default river level map and loads it to the data table



River Level Maps C:\Documents and Settings\joareall\ Change River Level Maps

River Flow (m3/s)	Map File
0	\Data\INPUT\Hydromet\Wte
0.25	\Data\INPUT\Hydromet\Wte
0.47	\Data\INPUT\Hydromet\Wte
1	\Data\INPUT\Hydromet\Wte
2	\Data\INPUT\Hydromet\Wte
5	\Data\INPUT\Hydromet\Wte
10	\Data\INPUT\Hydromet\Wte

Flow (m3/s); Map with Water Table Elevation related to that flow (m.a.s.l.)

5. Methods to integrate Ribav 2D within Ripflow

Three Methods:

1. Through text files
2. DLL Files
3. Using CLI from MS Visual Studio.net

5. Methods to integrate Ribav 2D within Ripflow

1. Integration through text files

Advantages:

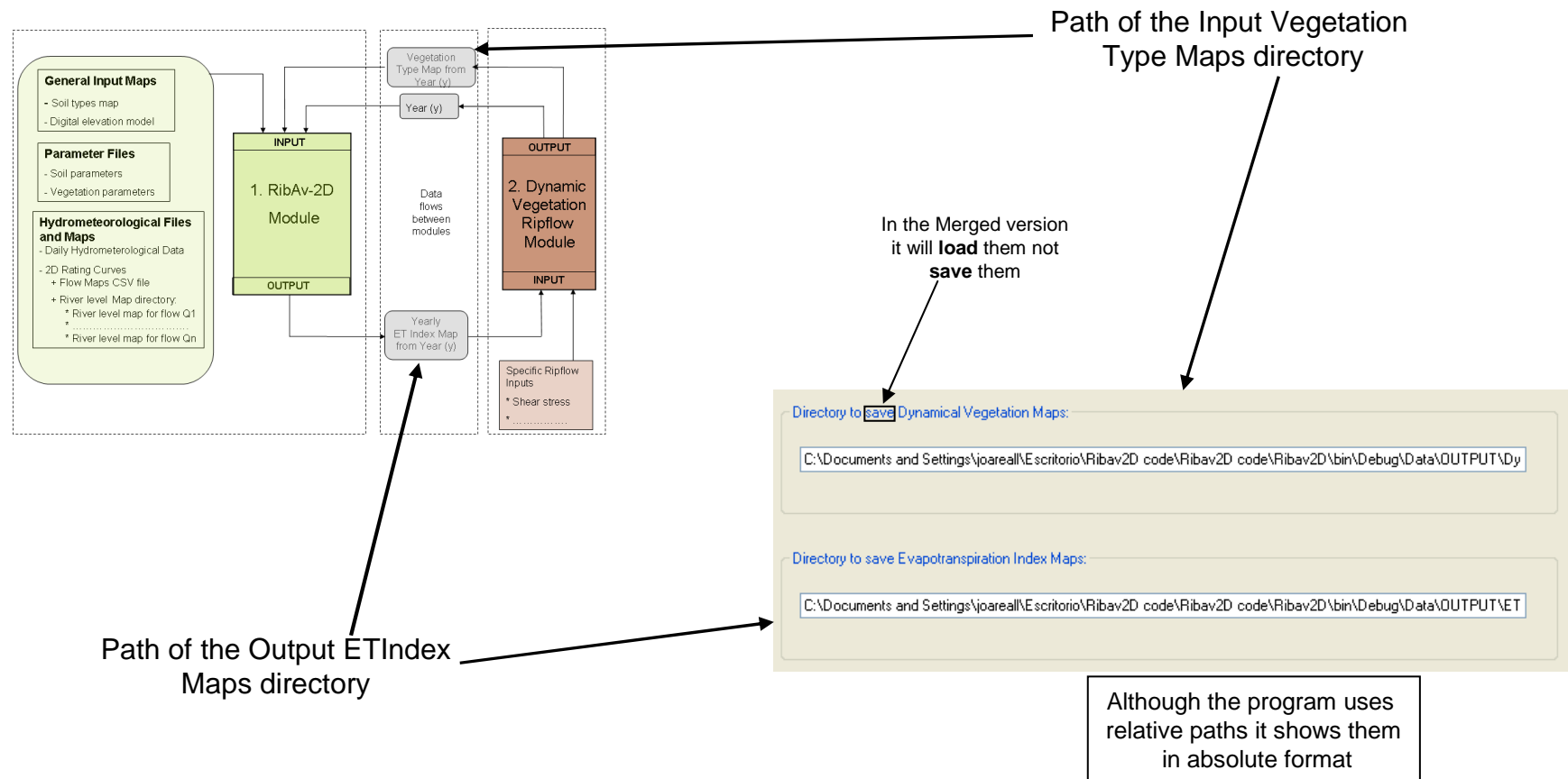
- Relatively easy to integrate with ArcGis and Python.
- Easier to carry out modifications.
- More easy to understand input and output flows within both modules.
- Recommended in the first version of Ribav.

Disadvantages:

- Less performance speed.
- Not very intuitive for a non-expert user

5. Methods to integrate Ribav 2D within Ripflow

Actual example of Textfile usage:



5. Methods to integrate Ribav 2D within Ripflow

2. DLL Files

- They stand for Dynamic Link Library and they are implemented for the Microsoft shared library for Windows.
- They are files that store functions and subroutines and can be created/loaded in different programming languages.
- The main characteristic is that they are “**Encapsulated**”, so a programmer can use them without knowing their internal code, only by defining their parameter inputs and expecting the outputs.
- They normally have a .dll extension although they can have a .ocx if they are related to the DirectX graphic library

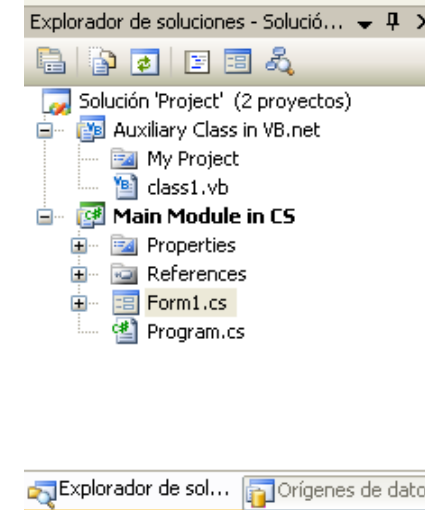
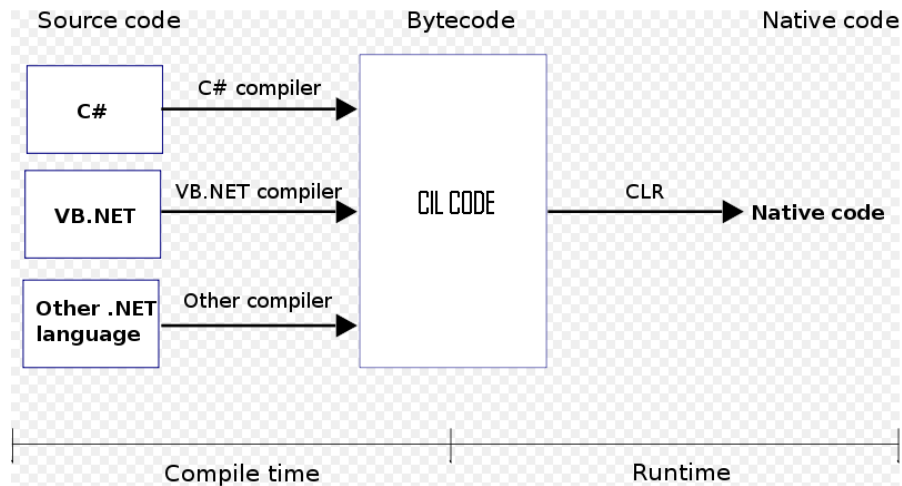
5. Methods to integrate Ribav 2D within Ripflow

3. Microsoft studio CLI

- It stands for Common Language Infrastructure.
- It is a component of the .NET framework which permits the usage of **different programming languages** in the source code of a program.
- To do this it uses an intermediate language called CIL (Common Intermediate Language) to which the various source code languages (C#, C++, VBasic...) are translated during the compilation.
- At runtime the CIL language is converted to the native code that the operating system or the computer understands.

5. Methods to integrate Ribav 2D within Ripflow

CLI Flow Diagram



Example of a Project in Visual Studio 2008 with modules in different languages (C# and VB.net)