A new tool for assessing environmental impacts of altering short-term flow and water level regimes

María Dolores Bejarano[1,*], Jaime H. García-Palacios[2], Alvaro Sordo-Ward[2], Luis Garrote[2] and Christer Nilsson[3]

[1] Department of Natural Systems and Resources, Universidad Politécnica de Madrid, 28040 Madrid, Spain; mariadolores.bejarano@upm.es

[2] Department of Civil Engineering: Hydraulics, Energy and Environment, Universidad Politécnica de Madrid, 28040 Madrid, Spain; jaime.garcia.palacios@upm.es; alvaro.sordo.ward@upm.es; l.garrote@upm.es

[3] Landscape Ecology Group, Department of Ecology and Environmental Science, Umeå University, SE-901 87 Umeå, Sweden; christer.nilsson@umu.se

[4] Department of Wildlife, Fish and Environmental Studies, Swedish University of Agricultural Sciences, SE-901 83 Umeå, Sweden; christer.d.nilsson@slu.se

* Correspondence: mariadolores.bejarano@upm.es; Tel.: +34-910671778

ELECTRONIC SUPPLEMENTARY MATERIAL A

Supplementary Materials A. Detailed description of the three modules of InSTAHn.

The three modules of InSTHAn correspond to the steps that must be followed to set up and complete an impact assessment analysis: Module I: Project management and data import; Module II: Characterization; and Module III: Impact assessment. Finally, outputs may be displayed in different ways.

To start, a project must be created and named in the computer through Module I: Project management and data import (Figure S1). An Excel file containing the original data series of short-term flows and/or water levels can be imported. Information on the original data series must be provided to InSTHAn before any analysis (Figure S1). The imported data series ("Raw" data and "Imported" data) are in the folder named "Excel" ("Excel" subdirectory) within the "Project 1" directory.
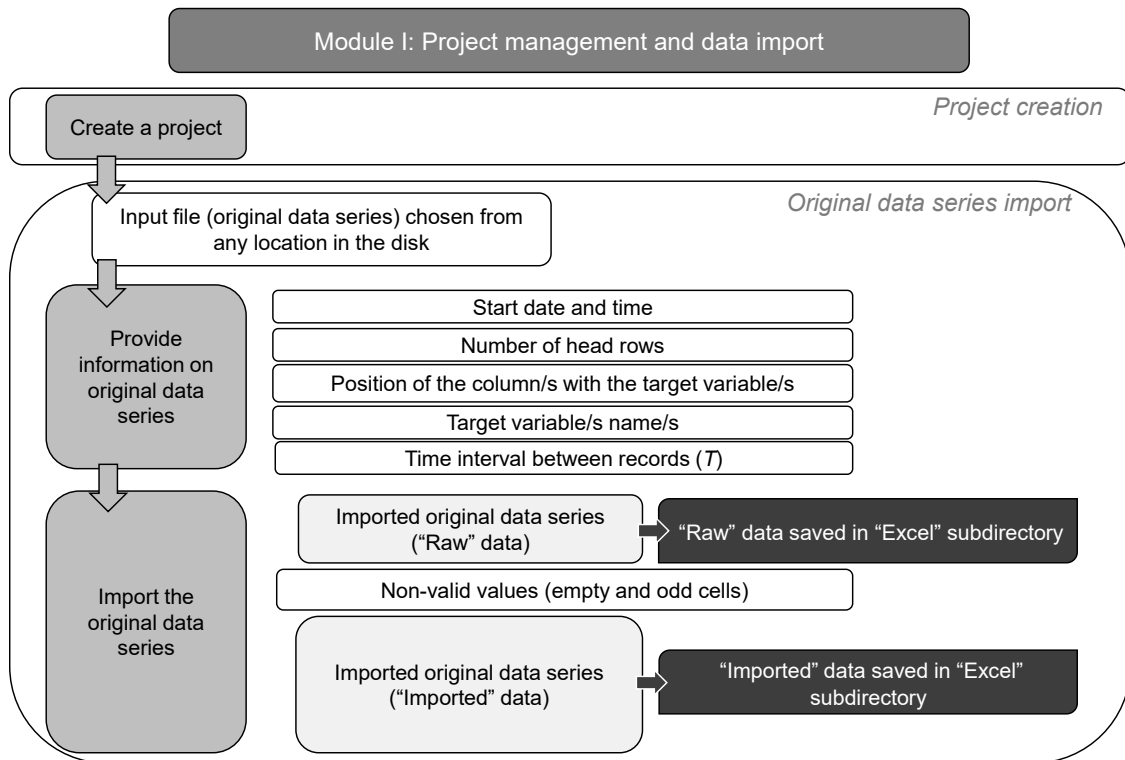

Figure S1. Project management and data import module (InSTHAn's Module I).

Afterwards, Characterization analyses can be run in Module II: Characterization (Figure S2). Every Characterization analysis involves the imported original data series ("Imported" data) pre-processing (getting the "Pre-processed" data) and the calculation of the STCI (Figure S2). After all specifications of the analysis are set in the pre-processing stage, the user may proceed to get the STCI. When running a Characterization analysis, InSTHAn performs calculations on the short-term flow or water level "Pre-processed" data. For each single day of the n-year series, first, it identifies the R and P patterns (getting the "RP Patterns" file), to later calculate the record-based and period-based STCI (getting the "STCI 366 × n" file). Finally, InSTHAn calculates the whole suite of record- and period-based STCI for a representative year of the n-year series, through an average of the values from the same day for the n years for each indicator (getting the "STCI 366" file). The first ("RP Patterns") and second ("STCI 366 × n") steps are intermediate processes, whereas the third one ("STCI 366") corresponds to the ultimate goal of a series characterization. Outputs from each Characterization analysis ("Pre-processed" data, "RP Patterns", "STCI 366 × n", and "STCI 366") are stored in the corresponding Characterization analyses folder within the "Project 1" directory ("Characterization" sub-directory). New Characterization analyses can be carried out within the same project and by using the same imported original data series but changing the analysis specifications (Figure S2).
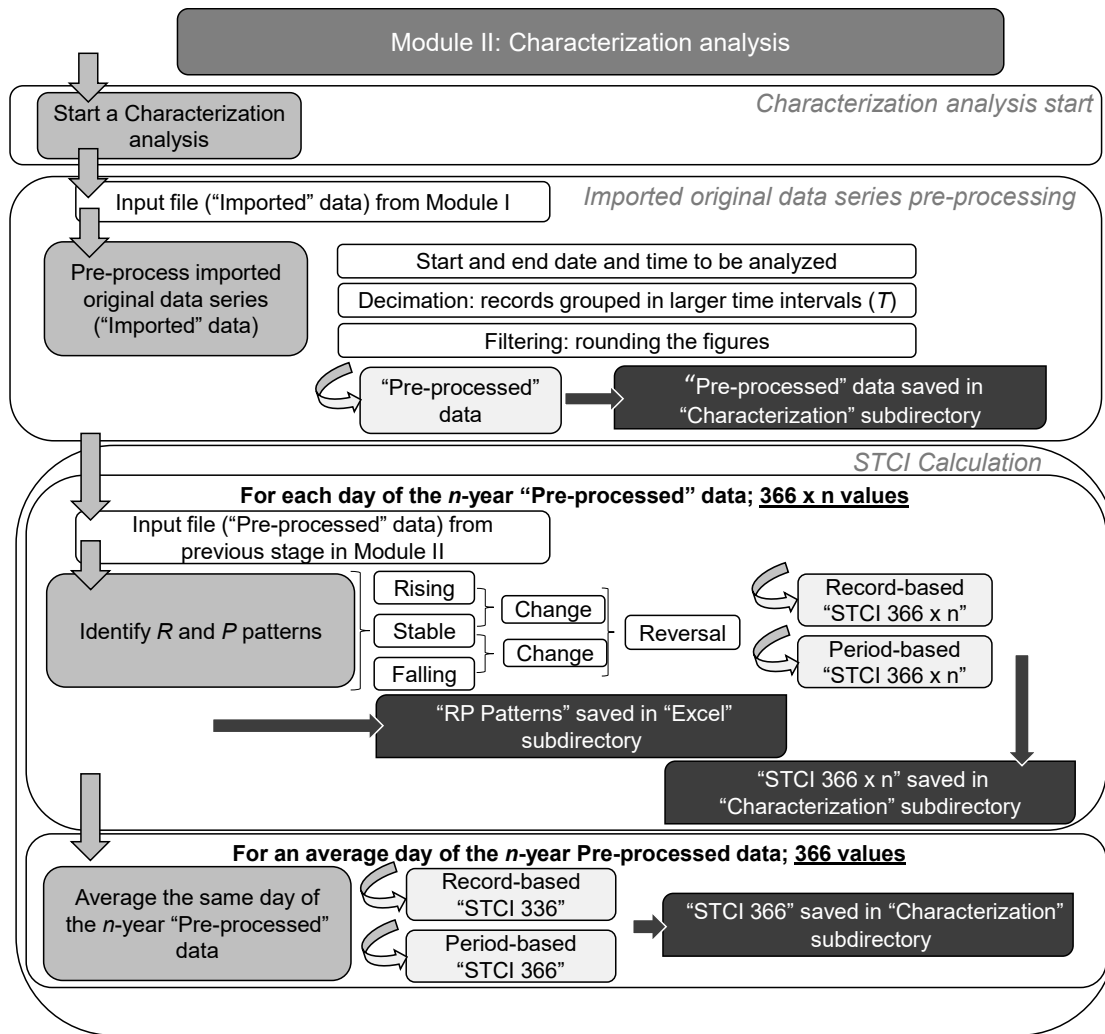
Figure S2. Characterization module (InSTHAn's Module II).

Finally, Impact analyses can be run in Module III: Impact assessment (Figure S3). When running an Impact analysis, InSTHAn performs calculations on the record-based and period-based STCI for an average day from the *n*-year series (i.e. "STCI 366") which have been previously obtained from both a natural and perturbed short-term data series, and which may have been generated beyond the same project or may be stored in a different project's folder. Outputs from the Impact analyses are saved in the corresponding Impact analyses folder within the project ("Impact" sub-directory). New Impact analysis can be carried out by using different "STCI 366" input data from previous analyses.
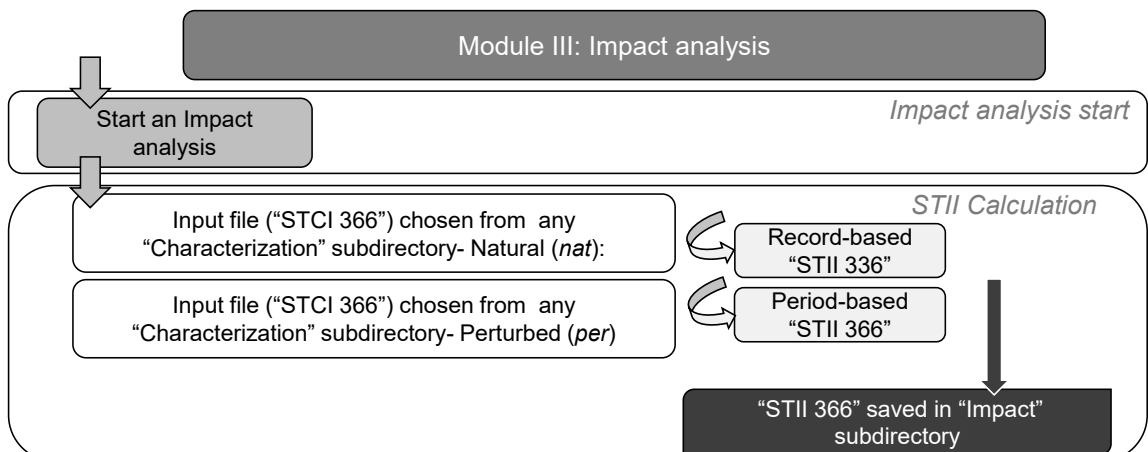

Figure S3. Impact assessment module (InSTHAn's Module III).

The outputs from each module are saved in the corresponding folder within the ongoing project, and can be displayed either in tables or graphs through .xlsx files. The imported original data series before ("Raw" data) and after the empty and odd cells have been identified ("Imported" data) in the Module I, and the pre-processed data series ("Pre-processed" data) which is ready for indicators calculations obtained in Module II may be visualized by the user in table form and through common hydrographs or limnographs. The R and P patterns identified for the "Pre-processed" data ("RP Patterns"), and the record- and period-based STCI calculated for each day ("STCI 366 x n") and for an average day of the n-year series ("STCI 366") in Module II, and the record- and period-based STII for an average day of the n-year series ("STII 366") from Module III, may be displayed in tables and graphs.

Supplementary Materials B. Example application for validation of InSTHAn.

Characterization of the short-term flow regime and impact assessment of the Glen Canyon

Dam on the short-term flow regime of the Colorado River. Step by step guide.

1. **Available data**

We had two original flow (m³/seg) data series (.xlsx files). The natural series corresponded to hourly flows measured between 1943 and 1951 (pre-dam period), whereas the perturbed series corresponded to every-15-minute flows measured between 2003 and 2011 (post-dam period), both at Less Ferry (9,380,000 gauging station; data from https://waterdata.usgs.gov/). The former file was characterized by one column (flow) without heading and five decimals precision measurements, and the latter was characterized by three columns (date, time, and flow) with their respective headings and two decimals' precision measurements.

Colorado_1943-1951_1h.xlsx
Colorado_2003-2011_15min.xlsx

2. **Module I: Start a new project and import the original data**

We start a new project by clicking on the corresponding button in the Module I named "Begin" from the main window of InSTHAn. An already existing project along with its analyses may be open and consulted anytime by clicking on the "Load project" button (Figure S4), analyses within the project may be edited and overwritten or saved as different analyses, and new analyses may be run within the project. In a new window, we detail information of our new project and the original data series to be used (Figure S5). We will create two different projects, named "ColoradoNat" for the project using the pre-dam data, and "ColoradoPer" for the project using the post-dam data, and indicate where in our computer we want their directories ("ColoradoNat" and "ColoradoPer" directories) to be created (e.g.: C:/InSTHAn/ejemplos). Then, we navigate in our computer to select the original data series file (e.g., C:/InSTHAn/datos/Colorado_1943-1951_1h.xlsx, or C:/InSTHAn/datos/Colorado_2003-2011_15min.xlsx) for each (Figure S5).
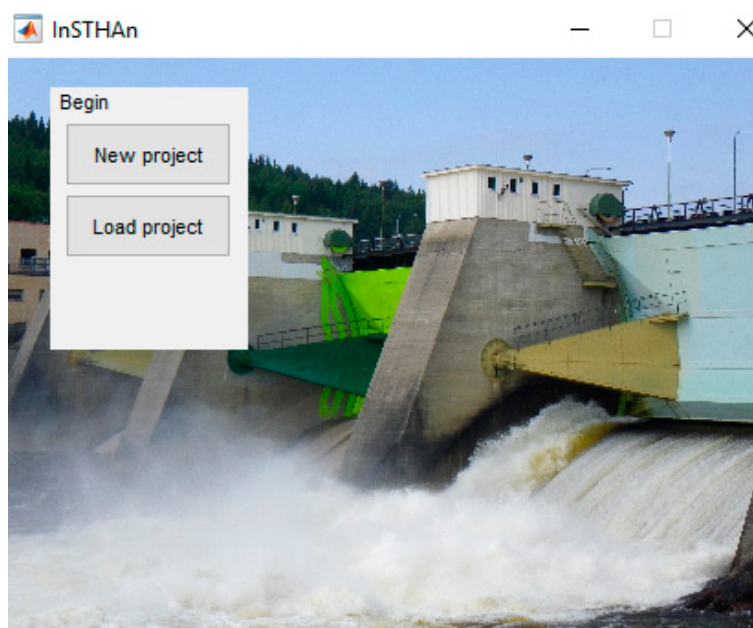

Figure S4. Start a new or load an existing project.

The selected original data series file may be seen by clicking on the button "See file" so it is easier to provide the information on the file which is subsequently requested: start date and time (01-Jan-1943; 00:00:00 or 01-Jan-2003; 00:00:00); time interval between records (60 min or 15 min); number of rows corresponding to headings (none or one); the name of the variable and the column in the file were the measurements are (Flow for both files, in the first or the third column); and the identification of empty or odd cells (99999 for both), for the natural and perturbed files, respectively (Figure S5). Then we import the original data series by clicking on the button "Import data" (Figure S5).

Figure S5. Import the original data.

We can visualize the imported original data series before ("Raw" data) and after the empty and odd cells have been identified ("Imported" data) by clicking on the button "Export project" from Module I in the main window (Figure S6). At the bottom of this window, the name and location of the ongoing project are shown. In a new window we are asked to export both "Raw" and "Imported" data files to their corresponding subdirectory named "Excel" within the corresponding project ("ColoradoNat" or "ColoradoPer"directory). We can also open both files without exiting InSTHAn (Figure S7). Once the original data series has been imported and from now on, each time the project is open, its corresponding original data series does not need to be imported again, unless a different original series is desired.
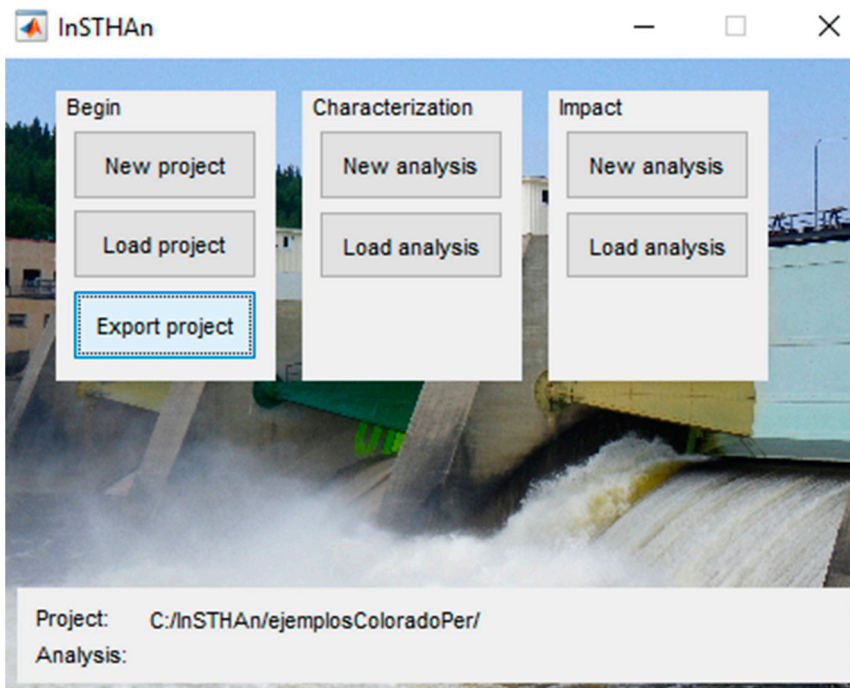
Figure S6. Export "Raw" data and "Imported" data. Example from the post-dam flows.

Figure S7. Export "Raw" data and "Imported" data.
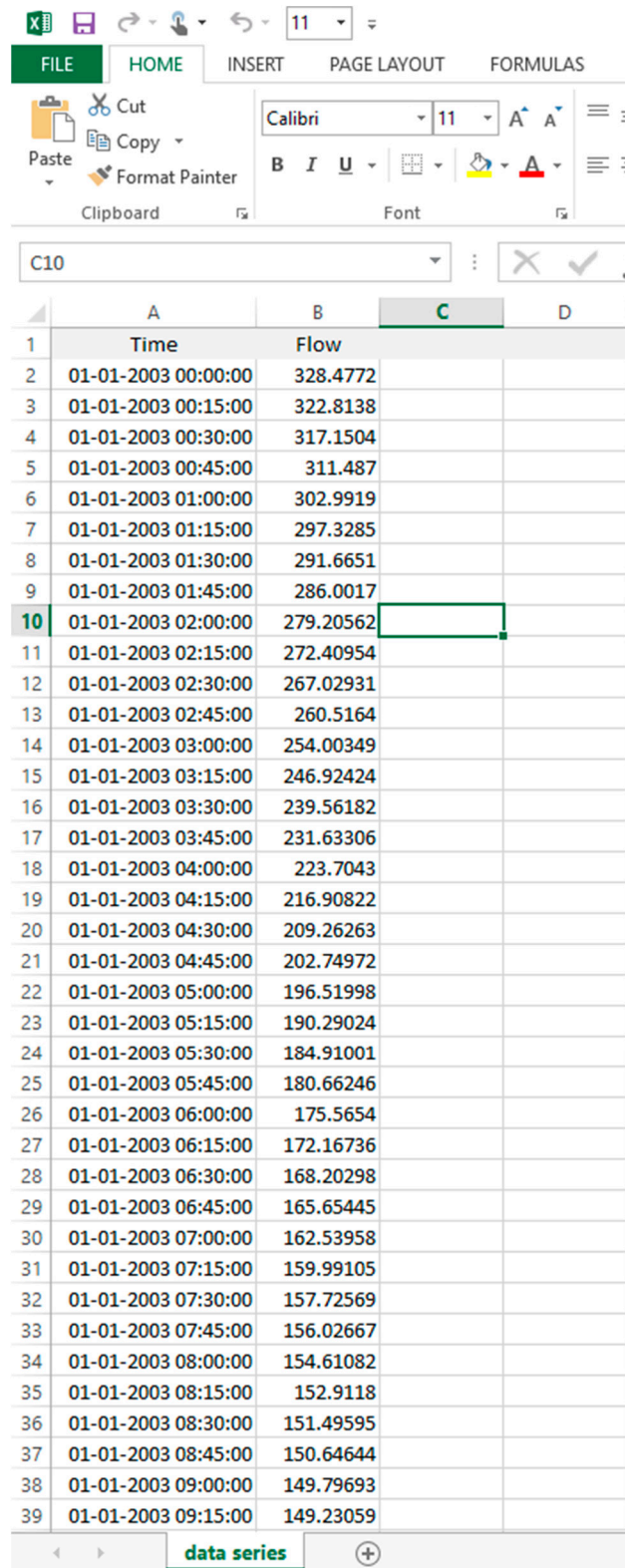
Figure S8. See "Imported" data. Example from the post-dam flows.

3. Module II: Characterization

Back to the main window of InSTHAn we may start a new Characterization analysis by clicking on the "New analysis" button in the Module II named "Characterization" (Figure S9). We can also load an already existing Characterization analysis by clicking on the button "Load analysis" in this module. In this case, a new window pops up listing the Characterization analyses ran within the

ongoing project and that may be loaded (Figure S10). In the Figure S10 we show the two characterization analyses that would be listed if we had already finished the entire characterization process with both the natural and perturbed data files.
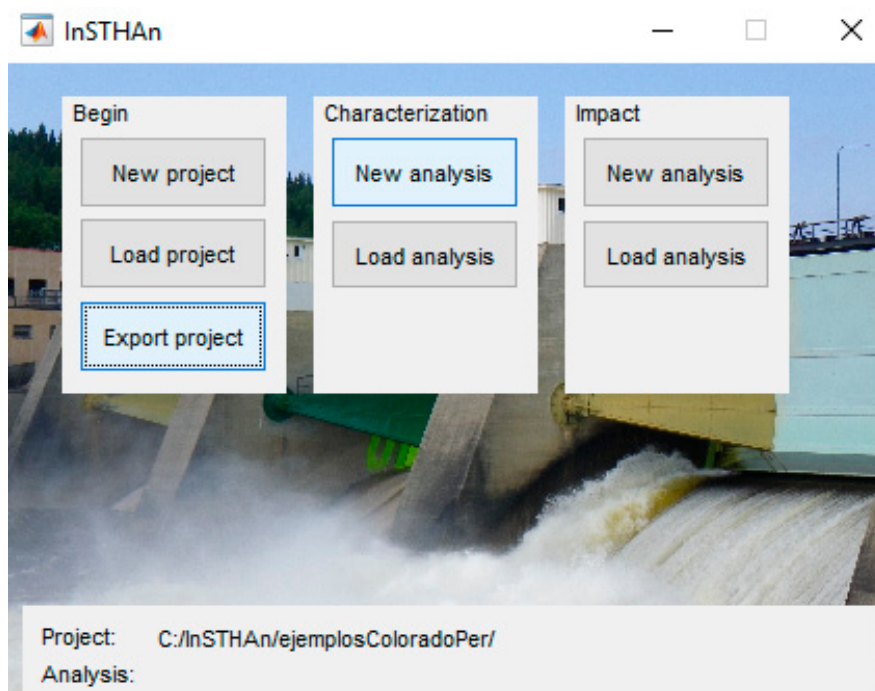

Figure S9. Create a new or load an existing Characterization analysis.
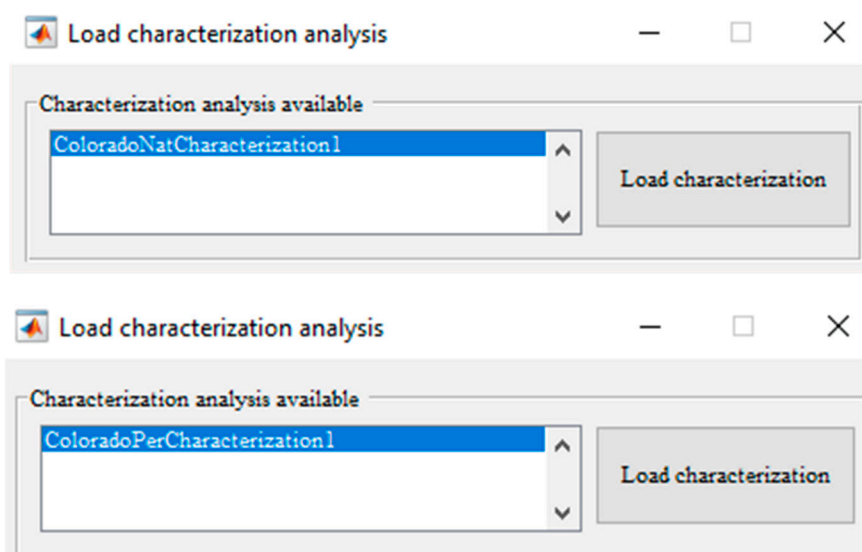

Figure S10. Select the Characterization analysis that we want to load from a list.

When clicking on the "New analysis" button in the Characterization module a new window appears where information on the current Characterization analysis must be specified (pre-process of the data series; Figure S11).
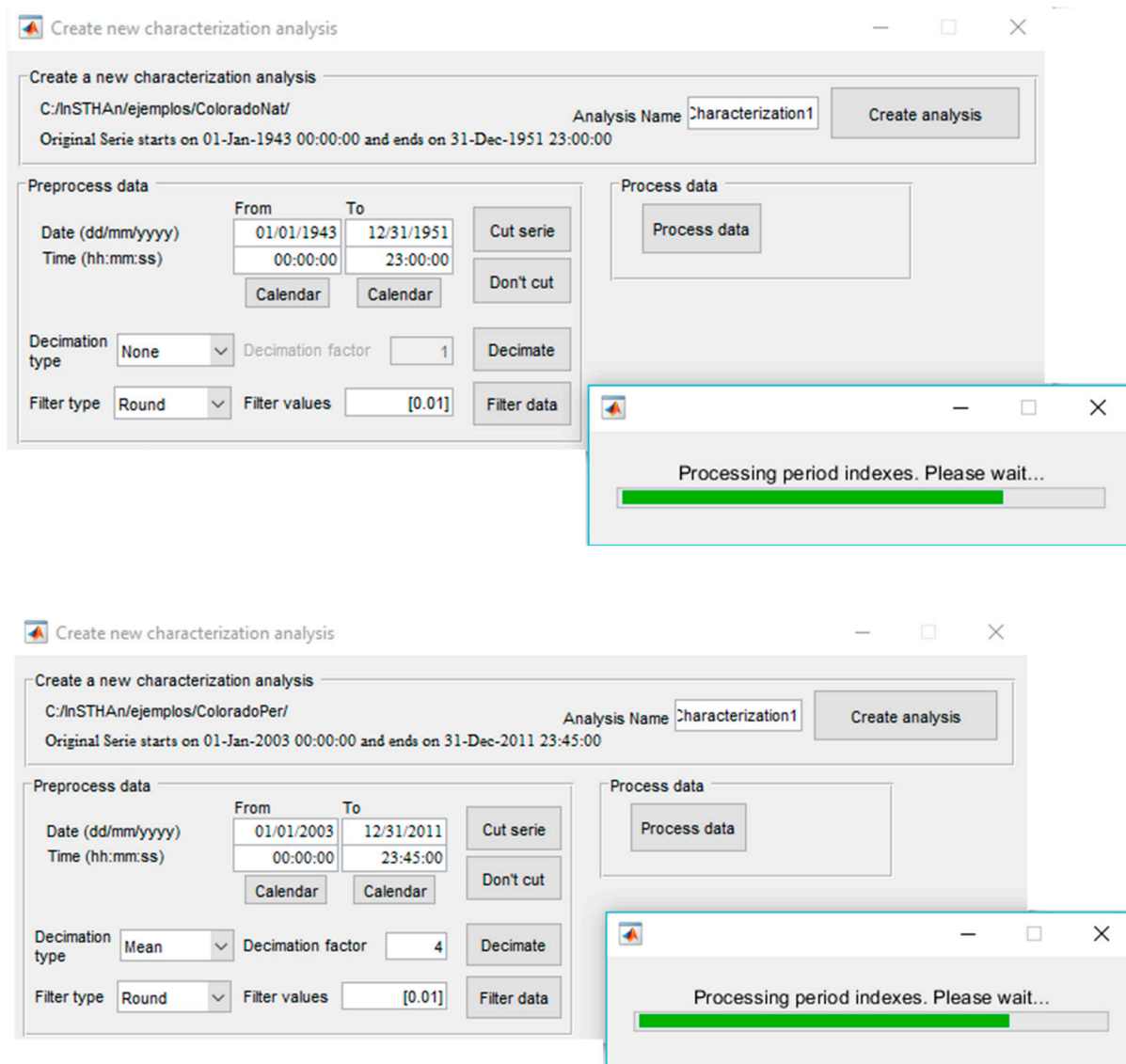
Figure S11. Create and run a new Characterization analysis.

First, we name the Characterization analysis: "ColoradoNatCharacterization1" for the characterization of the pre-dam data and "ColoradoPerCharacterization1" for the characterization of the post-dam data, and click on the "Create analysis" button (Figure S11). At this moment, the "Characterization" subdirectory within the project is created in our computer. Subsequently, we set the analysis specifications: the exact period we want to characterize (in our example, we do not cut our Imported data as we want to use the entire nine years data); the decimation factor (i.e., grouping records in larger T), being one when no decimation is desired (e.g. for the characterization of the natural flows) or four when we want to get hourly flows from every 15-minute records (e.g. for the characterization of the perturbed flows); and how we want to round the measurement figures (named filtering) (in our example, we have worked with two decimal places for both data series, thus we set 0.01 in the "Filter values" cell). The measurement tool's own error, or changes in the accuracy of data collection (e.g. measurements at decimal, centesimal, or thousandsimal level) may mask significant short-term oscillations or, contrarily, highlight oscillations along a stable regime. Consequently, data filtering is essential for setting a threshold from which two consecutive records are considered different (or equal), and hence, for the assignation of patterns to records (R) and periods (P).

Finally, we process the "Imported" data (Figure S11) and the main menu pops up again where the "Export analysis" button within the Module II is now enabled and where information on the

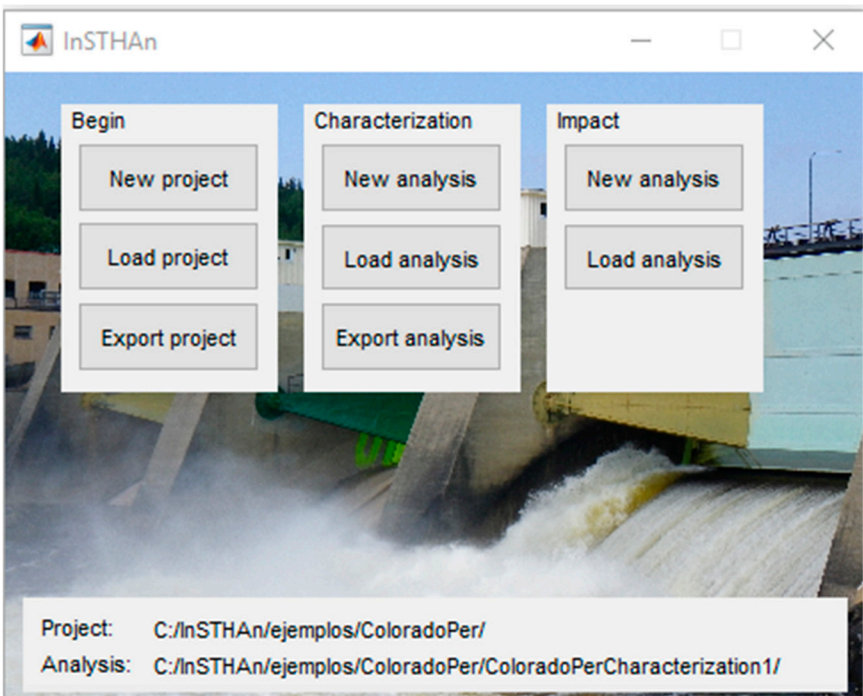name and location of the Characterization analysis is now updated at the bottom of the window (Figure S12).

Figure S12. Export Characterization analysis: main menu. Example from the post-dam flows.

After clicking on the button "Export analysis" a new window pops ups to export the main outputs from the characterization stage: pre-processed data (i.e., "Pre-processed" data), processed data (i.e. "RP Patterns"); and the Characterization indicators (i.e. "STCI 366 x n" and "STCI 366") (Figure S13). Some extra, more detailed results may also be exported after clicking on the button "Extra results" (Figure S14). Note that some of the extra results are still being developed and will be included in future versions of InSTHAn. All outputs are saved within the "Characterization" subdirectory and may be open without exiting InSTHAn by clicking on the buttons "See file" (Figures S15–S17).
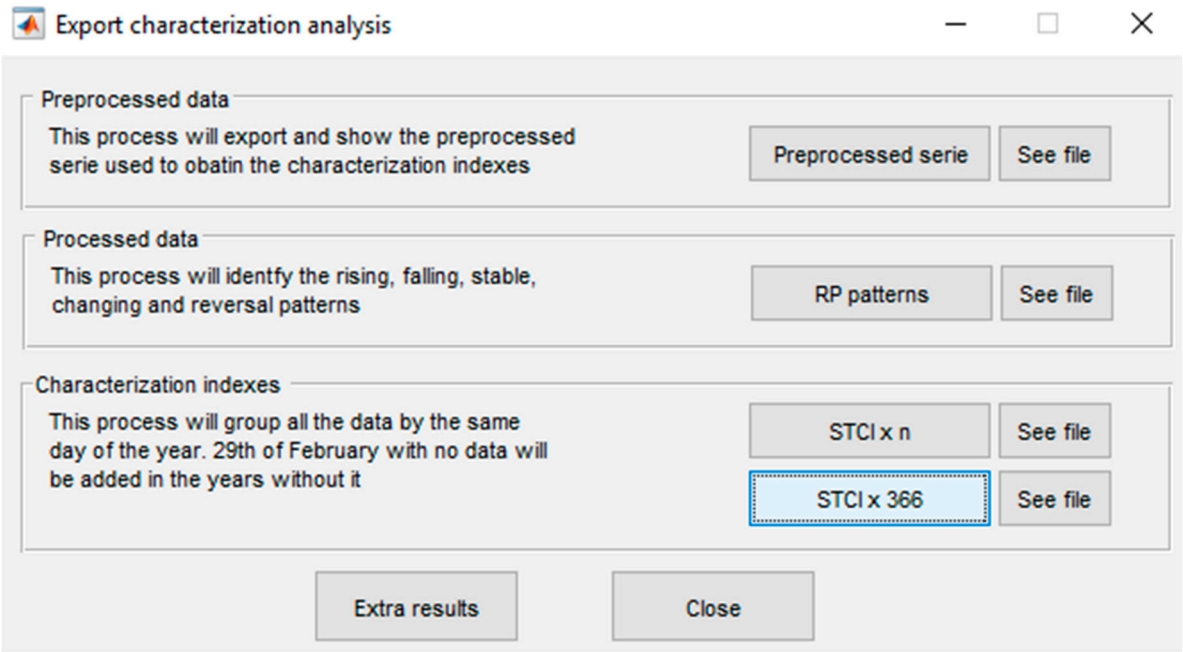
Figure S13. Export Characterization analysis: main results.
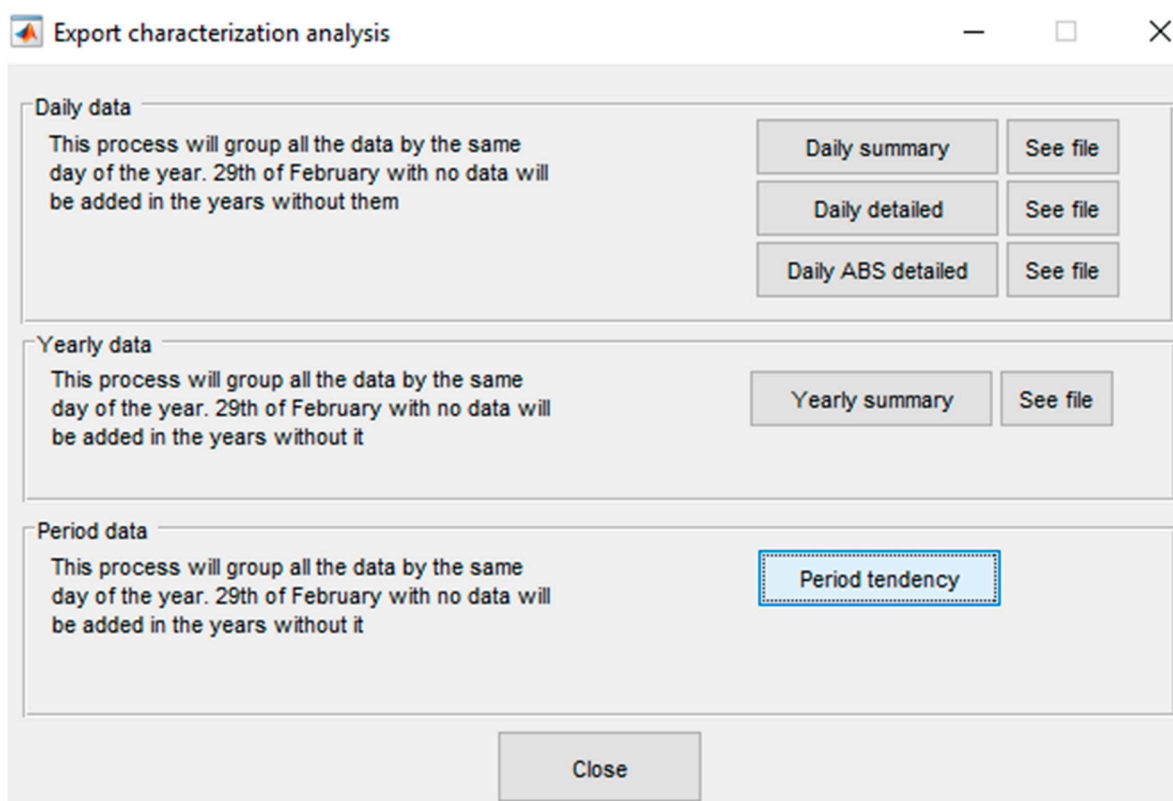
Figure S14. Export Characterization analysis: extra results.

Figure S15. See "Pre-processed" data. Example from the post-dam flows.

The "RP Patterns" file contains information on the different flow patterns (rise, fall, stability, change and reversals) identified for each day of the data series in table form ("Variable1" sheet; Figure S16). The user may also plot the patterns ("Graph-v1" sheet; Figure S17). Similarly, the "STCI 366 x

n" and "STCI 366" files contain both the values of the 30 indicators in table form ("Variable1" sheet; Figure S18) and in graph form ("Graph-v1" sheet; Figure S19). The user may plot any indicator separately or several indicators simultaneously in the same graph and may also select the period to be plotted.

	Date & Hour	Falling	Stable	Rising	Changing	Reversal
1	Date & Hour	Falling	Stable	Rising	Changing	Reversal
2	01-01-2003 00:22:30	319.98				
3	01-01-2003 01:22:30	294.5				
4	01-01-2003 02:22:30	269.79				
5	01-01-2003 03:22:30	243.03				
6	01-01-2003 04:22:30	213.16				
7	01-01-2003 05:22:30	188.1				
8	01-01-2003 06:22:30	170.4				
9	01-01-2003 07:22:30	159.07				
10	01-01-2003 08:22:30	152.42				
11	01-01-2003 09:22:30	148.74				
12	01-01-2003 10:22:30			147.39	147.39	147.39
13	01-01-2003 11:22:30			159.78		
14	01-01-2003 12:22:30			213.16		
15	01-01-2003 13:22:30			321.4		
16	01-01-2003 14:22:30			430.42		
17	01-01-2003 15:22:30			498.38		
18	01-01-2003 16:22:30			533.78		
19	01-01-2003 17:22:30			549.35		
20	01-01-2003 18:22:30			558.55		
21	01-01-2003 19:22:30			564.92		
22	01-01-2003 20:22:30	568.46			568.46	568.46
23	01-01-2003 21:22:30	565.63				
24	01-01-2003 22:22:30	546.52				
25	01-01-2003 23:22:30	507.58				
26	02-01-2003 00:22:30	458.74				
27	02-01-2003 01:22:30	402.81				
28	02-01-2003 02:22:30	345.47				
29	02-01-2003 03:22:30	290.53				
30	02-01-2003 04:22:30	241.33				
31	02-01-2003 05:22:30	204.59				
32	02-01-2003 06:22:30	180.52				
33	02-01-2003 07:22:30	165.02				
34	02-01-2003 08:22:30	156.17				
35	02-01-2003 09:22:30	151.64				
36	02-01-2003 10:22:30			150.01	150.01	150.01
37	02-01-2003 11:22:30			161.9		
38	02-01-2003 12:22:30			219.03		
39	02-01-2003 13:22:30			334.85		

Figure S16. See "RP Patterns" file: table sheet. Example from the post-dam flows.
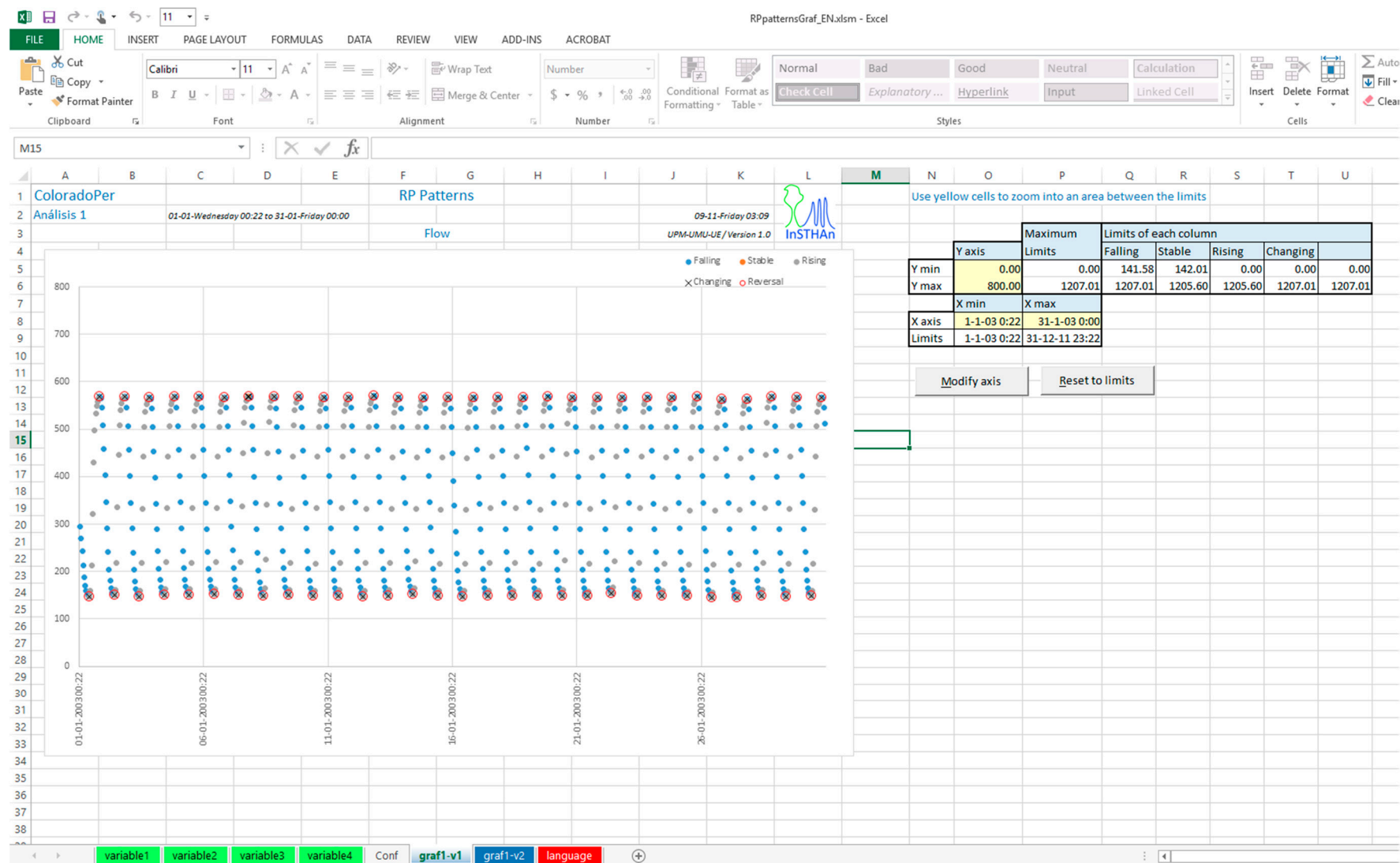
Figure S17. See "RP Patterns" file: graph sheet. Example from the post-dam flows (January, 2003 is represented).

Date	TRR	TFR	TSR	TCR	Trev	TMinR	TMaxR	TMeanR	TRP	TFP	TSP	TMinSP	TMaxSP	TMeanSP	DurRP	DurFP	DurSP	DurMinSP	DurMaxSP	DurMeanSP
dd/mm	records/day	records/day	records/day	records/day	records/day	records/day	records/day	records/day	periods/day	periods/day	periods/day	periods/day	periods/day	periods/day	records/day	records/day	records/day	records/day	records/day	records/day
Day and month	Frequency. Daily average of the within-day total records characterized by the rise in the variable	Frequency. Daily average of the within-day total records characterized by the fall in the variable	Frequency. Daily average of the within-day total records characterized by the stability in the variable	Frequency. Daily average of the within-day total records that are preceded and followed by different patterns in the variable	Frequency. Daily average of the within-day total times the variable hourly rises and falls	Frequency. Daily average of the within-day total records when the variable equals that day's minimum	Frequency. Daily average of the within-day total records when the variable equals or exceeds that day's maximum	Frequency. Daily average of the within-day total records when the variable equals that day's mean	Frequency. Daily average of the within-day total periods characterized by a sustained over time rise in the variable	Frequency. Daily average of the within-day total periods characterized by a sustained over time fall in the variable	Frequency. Daily average of the within-day total periods characterized by a sustained over time stability in the variable	Frequency. Daily average of the within-day total periods characterized by a sustained over time that day's stability periods minimum	Frequency. Daily average of the within-day total periods characterized by a sustained over time that day's stability periods maximum	Frequency. Daily average of the within-day total periods characterized by a sustained over time that day's stability periods mean	Duration. Daily average of the periods characterized by a sustained over time rise in the variable	Duration. Daily average of the periods characterized by a sustained over time fall in the variable	Duration. Daily average of the periods characterized by a sustained over time stability in the variable	Duration. Daily average of the periods characterized by a sustained over time that day's stability periods minimum	Duration. Daily average of the periods characterized by a sustained over time that day's stability periods maximum	Duration. Daily average of the periods characterized by a sustained over time that day's stability periods mean
01-01	10.78	13.11	0.11	3.89	3.78	1.00	1.00	12.78	2.33	2.33	0.11	0.11	0.11	0.11	4.62	5.62	1.00	1.00	1.00	1.00
02-01	10.78	13.22	0.00	3.56	3.56	1.00	1.00	13.22	2.11	2.22	0.00	0.00	0.00	0.00	5.11	5.95				
03-01	11.00	12.89	0.11	3.44	3.33	1.11	1.00	12.78	2.11	2.11	0.11	0.11	0.11	0.11	5.21	6.11	1.00	1.00	1.00	1.00
04-01	10.89	13.11	0.00	3.56	3.56	1.00	1.11	13.78	2.22	2.22	0.00	0.00	0.00	0.00	4.90	5.90				
05-01	10.11	13.56	0.33	3.67	3.33	1.00	1.22	13.89	2.00	2.11	0.33	0.22	0.22	0.22	5.06	6.42	1.00	1.00	1.00	1.00
06-01	10.44	13.44	0.11	3.44	3.33	1.00	1.00	13.67	2.00	2.11	0.11	0.11	0.11	0.11	5.22	6.37	1.00	1.00	1.00	1.00
07-01	10.11	13.67	0.22	3.67	3.33	1.00	1.11	13.33	2.11	2.11	0.22	0.22	0.22	0.22	4.79	6.47	1.00	1.00	1.00	1.00
08-01	10.33	13.56	0.11	3.67	3.56	1.00	1.11	12.44	2.22	2.22	0.11	0.11	0.11	0.11	4.65	6.10	1.00	1.00	1.00	1.00
09-01	10.67	13.11	0.22	3.67	3.33	1.00	1.11	13.00	2.22	2.11	0.22	0.22	0.22	0.22	4.80	6.21	1.00	1.00	1.00	1.00
10-01	10.22	13.44	0.33	3.89	3.56	1.00	1.11	13.22	2.22	2.22	0.33	0.33	0.33	0.33	4.60	6.05	1.00	1.00	1.00	1.00
11-01	10.11	13.78	0.11	3.56	3.33	1.00	1.00	13.22	2.11	2.11	0.11	0.11	0.11	0.11	4.79	6.53	1.00	1.00	1.00	1.00
12-01	10.22	13.56	0.22	3.56	3.33	1.00	1.00	13.22	2.00	2.22	0.22	0.22	0.22	0.22	5.11	6.42	1.00	1.00	1.00	1.00
13-01	10.00	13.56	0.44	4.00	3.56	1.11	1.22	13.56	2.11	2.22	0.44	0.44	0.44	0.44	4.74	6.10	1.00	1.00	1.00	1.00
14-01	10.22	13.78	0.00	3.56	3.56	1.00	1.00	13.33	2.11	2.22	0.00	0.00	0.00	0.00	4.84	6.20				
15-01	10.67	13.22	0.11	3.67	3.56	1.00	1.00	13.00	2.33	2.22	0.11	0.11	0.11	0.11	4.57	5.95	1.00	1.00	1.00	1.00
16-01	10.44	13.00	0.56	3.89	3.33	1.11	1.00	12.67	2.22	2.11	0.44	0.44	0.44	0.44	4.70	6.16	1.25	1.00	2.00	2.00
17-01	10.67	13.00	0.33	3.78	3.33	1.11	1.00	13.11	2.11	2.11	0.33	0.33	0.33	0.33	5.05	6.16	1.00	1.00	1.00	1.00
18-01	10.22	13.33	0.44	3.78	3.33	1.00	1.22	13.44	2.22	2.11	0.33	0.22	0.22	0.22	4.60	6.32	1.33	2.00	1.00	1.00
19-01	10.56	13.33	0.11	3.44	3.33	1.00	1.00	13.22	2.00	2.11	0.11	0.11	0.11	0.11	5.28	6.32	1.00	1.00	1.00	1.00
20-01	10.33	13.56	0.11	3.44	3.33	1.00	1.11	13.33	2.00	2.11	0.11	0.11	0.11	0.11	5.17	6.42	1.00	1.00	1.00	1.00
21-01	10.00	13.89	0.11	3.44	3.33	1.00	1.00	12.89	2.00	2.11	0.11	0.11	0.11	0.11	5.00	6.58	1.00	1.00	1.00	1.00
22-01	10.22	13.33	0.44	3.78	3.33	1.11	1.11	12.89	2.11	2.22	0.33	0.33	0.33	0.33	4.84	6.00	1.33	1.00	1.00	1.50
23-01	10.67	13.11	0.22	3.56	3.33	1.00	1.11	12.44	2.11	2.11	0.22	0.22	0.22	0.22	5.05	6.21	1.00	1.00	1.00	1.00
24-01	10.56	13.22	0.22	3.78	3.56	1.00	1.11	13.00	2.22	2.22	0.22	0.11	0.11	0.11	4.75	5.95	1.00	1.00	1.00	1.00
25-01	9.89	13.67	0.44	4.00	3.56	1.22	1.33	13.67	2.22	2.22	0.44	0.44	0.44	0.44	4.45	6.15	1.00	1.00	1.00	1.00
26-01	10.56	13.22	0.22	3.67	3.33	1.22	1.11	13.78	2.11	2.11	0.22	0.11	0.11	0.11	5.00	6.26	1.00	1.00	1.00	1.00
27-01	10.22	13.78	0.00	3.33	3.33	1.00	1.00	13.33	2.00	2.11	0.00	0.00	0.00	0.00	5.11	6.53				
28-01	9.89	14.11	0.00	3.33	3.33	1.00	1.00	13.11	2.00	2.11	0.00	0.00	0.00	0.00	4.94	6.68				
29-01	10.11	13.56	0.33	3.78	3.33	1.00	1.00	12.44	2.22	2.11	0.33	0.33	0.33	0.33	4.55	6.42	1.00	1.00	1.00	1.00

Figure S18. See "STCI 366" file: table sheet. Example from the post-dam flows.
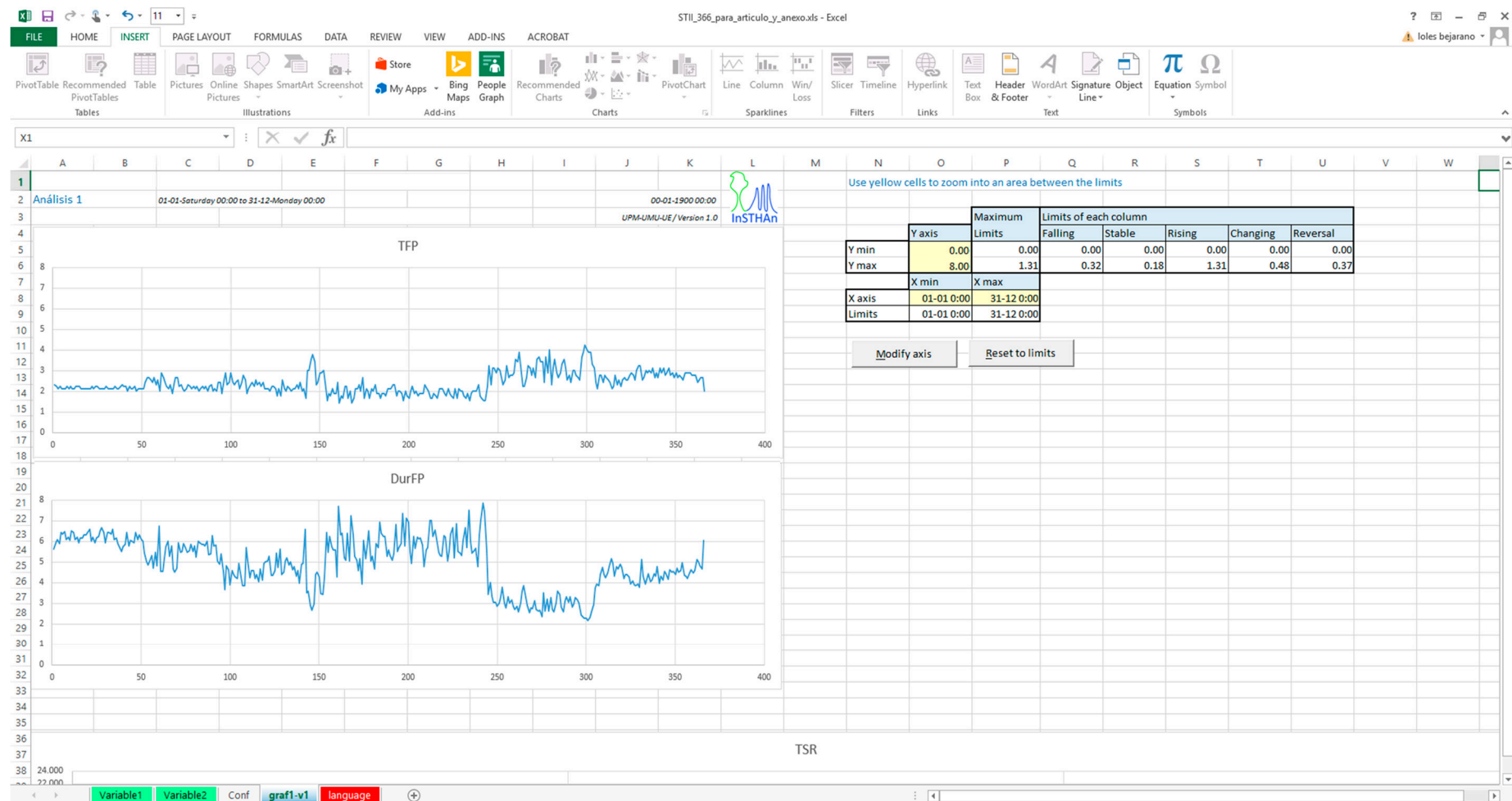
Figure S19. See "STCI 366" file: graph sheet. Example from the post-dam flows (The entire year values for two indicators are shown).

4. Module III: Impact assessment

Back to the main window of InSTHAn we may start a new Impact analysis by clicking on the "New analysis" button in the Module III named "Impact" (Figure S20). We can also load an already existing Impact analysis by clicking on the button "Load analysis" in the same module. In this case, a new window pops up listing the Impact analyses ran within the ongoing project and that may be loaded. Note that the Impact analysis outputs will be saved in the ongoing project (which is specified at the bottom of the main window of InSTHAn). Should we change the project where the "Impact" subdirectory is created, we need to load the desired project by clicking on the corresponding button in the Module I.
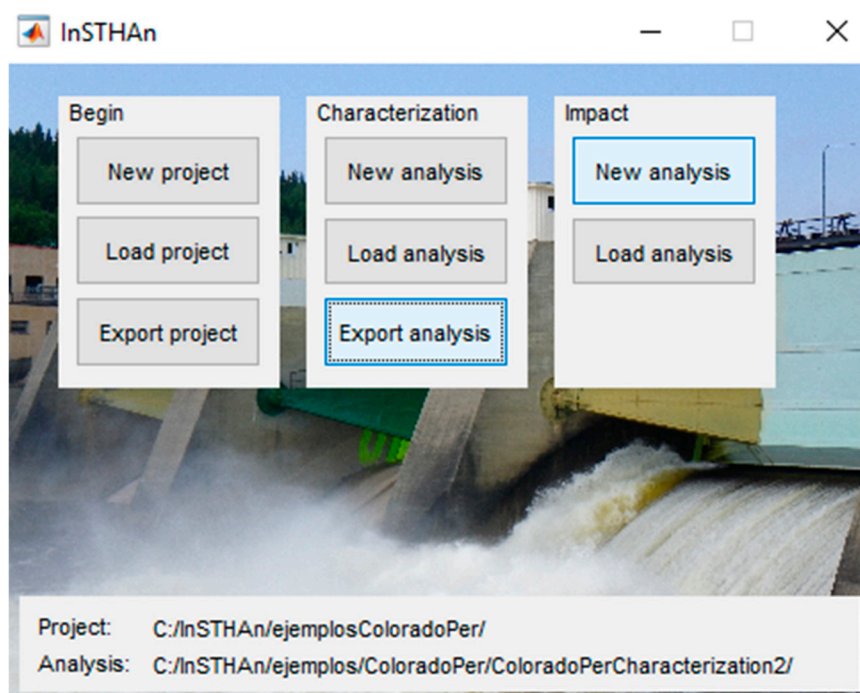

Figure S20. Create a new or load an existing Impact analysis.

For a new Impact analysis, a window pops up where information on the current Impact analysis must be specified (Figure S21). First, we name the analysis: "ColoradoImpact1", and click on the "Create analysis" button (Figure S21). At this moment, the Impact subdirectory within the ongoing project is created in our computer. Subsequently, we indicate to InSTAHn the characterization files to compare, natural and perturbed (i.e. "ColoradoNatCharacterization1" and "ColoradoPerCharacterization1") by selecting them from the InSTHAn dropdown menu and clicking on the "Load characterization" button (Figure S21). Finally, we asked InSTHAn to calculate the STII 366 by clicking on the "Process data" button (Figure S21). Subsequently, the main menu pops up again where the "Export analysis" button within the Module III is now enabled and where information on the name and location of the already ran Impact analysis is now updated at the bottom of the window (Figure S22). After clicking on the button "Export analysis" a new window pops ups to export the outputs from the impact stage: the Impact indicators (i.e. "STII 366") (Figure S23). All outputs are saved within the "Impact" subdirectory and may be open without exiting InSTHAn by clicking on the buttons "See file" (Figures S24 and S25).
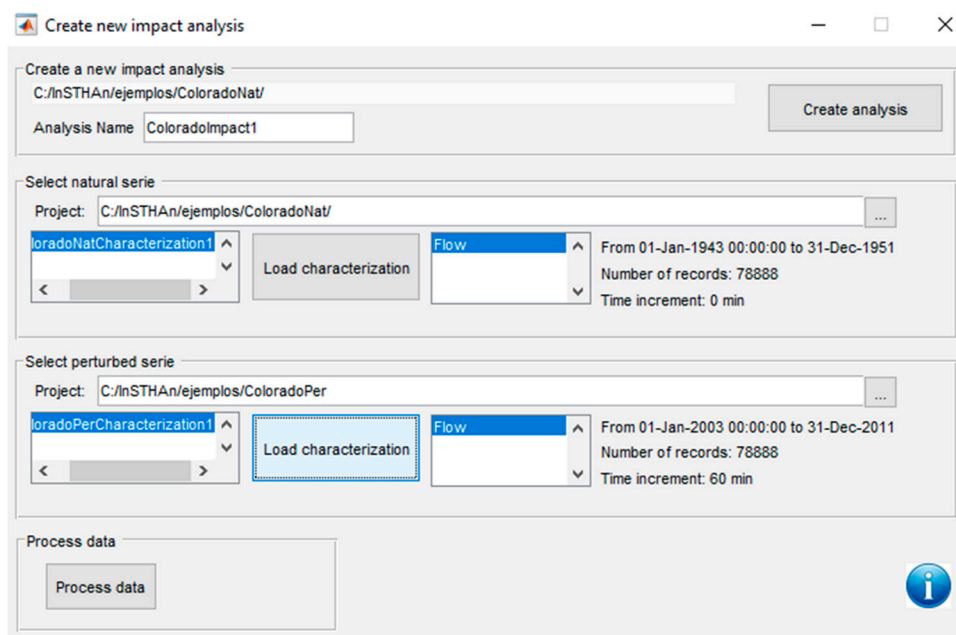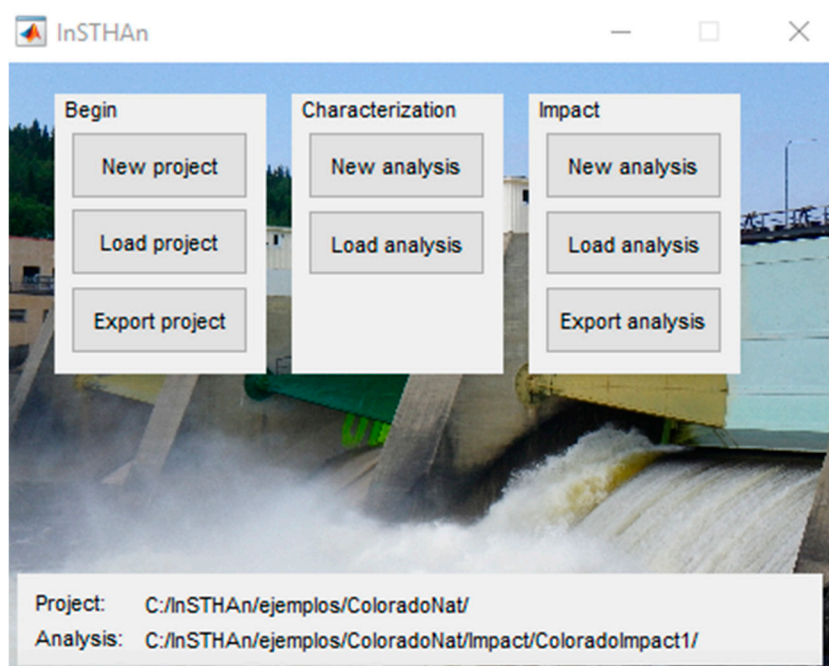
Figure S21. Create and run a new Impact analysis.
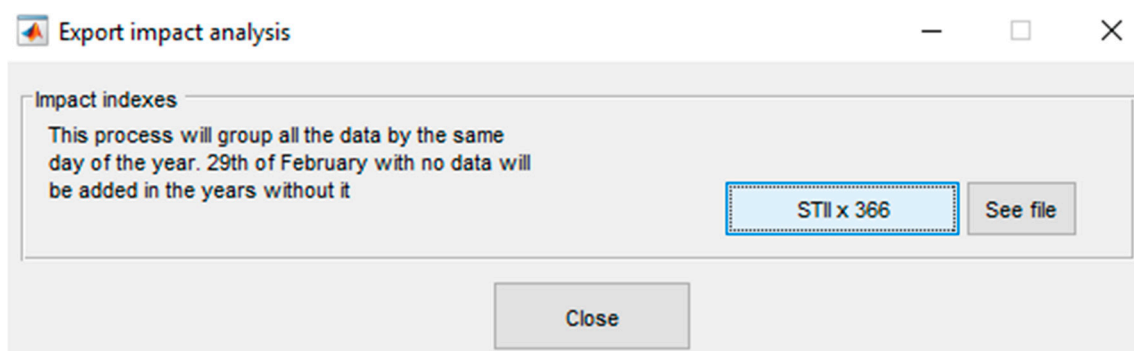

Figure S22. Export Impact analysis: main menu.

Figure S23. Export Impact analysis.

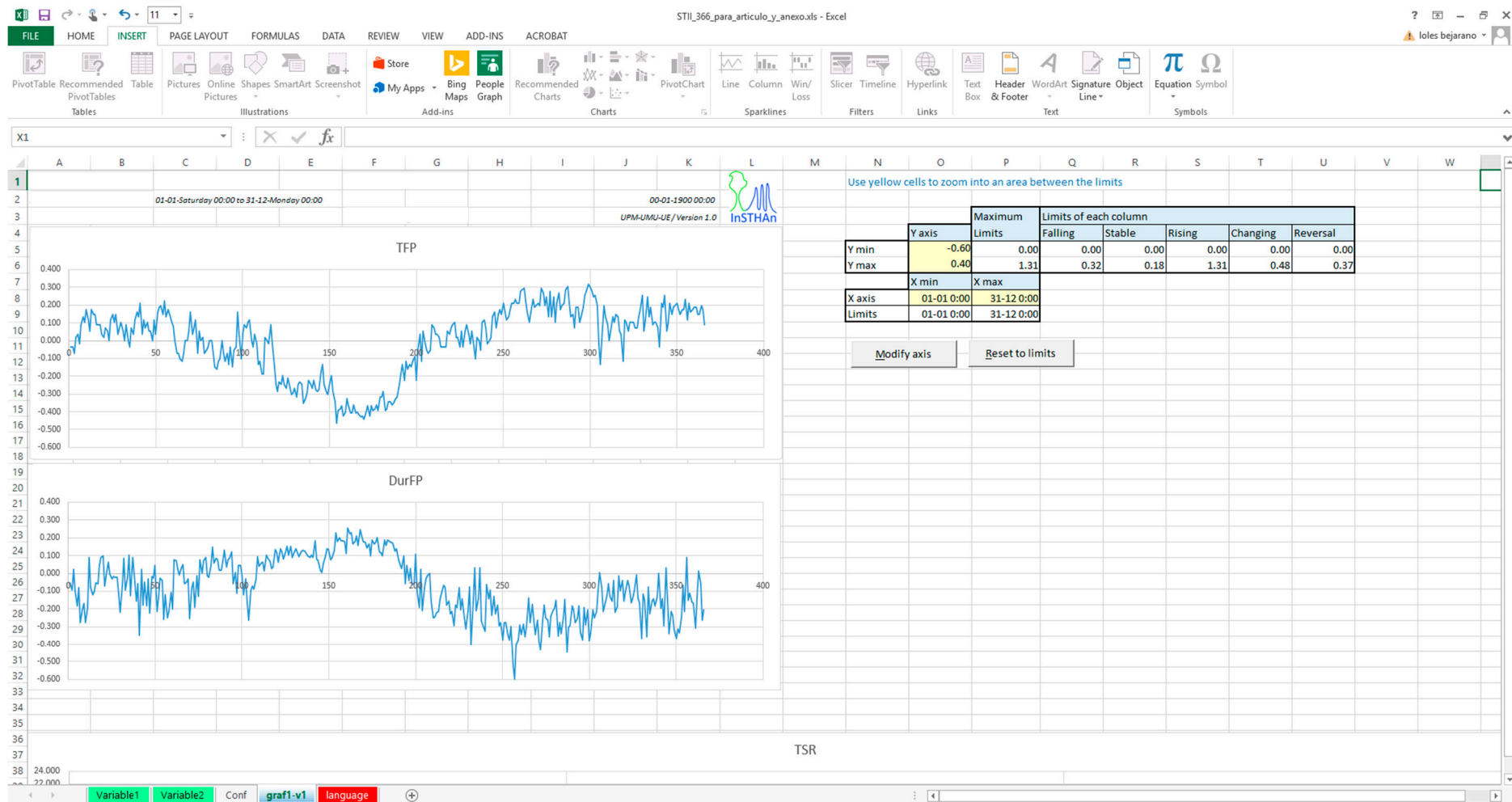| Date	TRR	TFR	TSR	TCR	Trev	TMinR	TMaxR	TMeanR	TRP	TFP	TSP	TMinSP	TMaxSP	TMeanSP	DurRP	DurFP	DurSP	DurMinSP	DurMaxSP	DurMeanSP
dd/mm	records/day	records/day	records/day	records/day	records/day	records/day	records/day	records/day	periods/day	periods/day	periods/day	periods/day	periods/day	periods/day	records/day	records/day	records/day	records/day	records/day	records/day
Day and month	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Duration	Duration	Duration	Duration	Duration	Duration
01-01	0.145	-0.100	-0.449	-0.032	0.023	0.000	-0.154	0.031	0.056	-0.037	-0.415	-0.481	-0.481	-0.481	0.094	-0.053	-0.166	0.000	-0.385	-0.318
02-01	0.177	-0.144	0.000	0.032	0.035	0.000	0.000	0.039	0.073	-0.037	0.000	0.000	0.000	0.000	0.125	-0.093				
03-01	0.080	-0.058	-0.205	-0.052	0.000	0.043	0.000	0.057	0.000	-0.071	-0.316	-0.224	-0.224	-0.224	0.075	0.021	0.000	0.000	0.000	0.000
04-01	0.110	-0.086	-0.115	0.052	0.067	0.000	0.000	0.087	0.073	0.019	-0.186	-0.224	-0.224	-0.224	0.036	-0.098				
05-01	0.189	-0.144	-0.344	0.099	0.097	0.000	0.084	0.070	0.106	0.037	0.186	0.000	0.000	0.000	0.122	-0.184	-0.406	0.000	-0.659	-0.663
06-01	0.155	-0.109	-0.449	-0.062	0.012	0.000	-0.084	0.067	0.000	-0.019	-0.415	-0.224	-0.224	-0.224	0.152	-0.082	-0.166	0.000	-0.234	-0.235
07-01	0.186	-0.152	0.000	0.149	0.151	0.000	0.044	0.031	0.150	0.087	0.000	0.000	0.000	0.000	0.053	-0.275	0.000	0.000	0.000	0.000
08-01	-0.014	0.007	0.115	0.172	0.176	0.000	0.044	0.020	0.164	0.132	0.186	0.224	0.224	0.224	-0.286	-0.200				
09-01	0.009	-0.014	0.205	0.149	0.134	0.000	0.044	0.035	0.121	0.103	0.316	0.371	0.371	0.371	-0.164	-0.169				
10-01	-0.069	0.045	0.280	0.229	0.221	0.000	0.044	0.016	0.191	0.173	0.415	0.481	0.481	0.481	-0.427	-0.277				
11-01	0.027	0.004	-0.493	0.165	0.191	0.000	-0.044	0.031	0.178	0.118	-0.316	-0.371	-0.371	-0.371	-0.322	-0.193	-0.308	0.000	0.000	0.000
12-01	-0.168	0.134	0.115	0.081	0.077	0.000	0.000	0.016	0.038	0.054	0.186	0.224	0.224	0.224	-0.214	0.087	0.000	0.000	0.000	0.000
13-01	-0.210	0.165	0.280	0.187	0.184	0.043	0.084	0.125	0.090	0.173	0.415	0.481	0.481	0.481	-0.322	-0.080	0.000	0.000	0.000	0.000
14-01	-0.121	0.103	-0.205	0.133	0.176	0.000	0.000	0.053	0.106	0.146	-0.316	-0.224	-0.224	-0.224	-0.268	-0.122				
15-01	-0.117	0.109	-0.400	0.108	0.176	0.000	0.000	0.049	0.121	0.146	-0.415	-0.224	-0.224	-0.224	-0.260	-0.103	-0.117		-0.196	
16-01	-0.099	0.064	0.400	0.125	0.087	0.043	0.000	0.031	0.056	0.087	0.497	0.568	0.568	0.568	-0.153	-0.052				
17-01	-0.073	0.058	0.000	0.062	0.087	0.043	0.000	0.035	0.038	0.087	0.000	0.000	0.000	0.000	-0.114	-0.060	0.000	0.000	0.000	0.000
18-01	-0.174	0.134	0.280	0.072	0.056	0.000	0.084	0.060	0.020	0.087	0.316	0.224	0.224	0.224	-0.176	0.050	0.081	0.196	0.000	0.000
19-01	-0.148	0.123	-0.115	0.032	0.056	0.000	0.044	0.042	0.020	0.037	-0.186	-0.224	-0.224	-0.224	-0.170	0.091	0.000	0.000	0.000	0.000
20-01	-0.088	0.117	-0.766	-0.011	0.077	0.000	0.044	0.060	0.056	0.019	-0.497	-0.481	-0.481	-0.481	-0.164	0.099	-0.395	-0.587	-0.234	-0.093
21-01	-0.031	0.032	-0.205	0.072	0.097	0.000	0.000	0.031	0.073	0.071	-0.186	-0.224	-0.224	-0.224	-0.135	-0.069	-0.117	0.000	-0.234	-0.235
22-01	-0.080	0.073	-0.280	-0.022	0.023	-0.082	0.044	0.031	0.000	0.054	-0.415	-0.481	-0.481	-0.481	-0.075	0.015	0.043	-0.196	0.000	0.134
23-01	-0.073	0.067	-0.280	-0.042	0.012	0.000	0.000	0.012	-0.038	0.000	-0.316	0.000	0.000	0.000	-0.026	0.064	-0.062	0.000	-0.234	-0.093
24-01	-0.135	0.128	-0.493	0.062	0.151	-0.043	0.044	0.031	0.073	0.118	-0.565	-0.481	-0.481	-0.481	-0.210	-0.003	-0.071	0.000	0.000	-0.072
25-01	-0.195	0.152	0.280	0.172	0.168	0.082	0.120	0.031	0.106	0.146	0.415	0.481	0.481	0.481	-0.316	-0.031	0.000	0.000	0.000	0.000
26-01	-0.121	0.109	-0.344	0.099	0.134	-0.118	0.000	0.042	0.106	0.103	-0.316	-0.224	-0.224	-0.224	-0.272	-0.018	-0.117	-0.331	0.000	0.000
27-01	-0.186	0.165	-0.400	0.099	0.142	-0.118	-0.044	0.016	0.056	0.146	-0.415	-0.481	-0.481	-0.481	-0.260	-0.024				
28-01	-0.005	0.028	-0.493	0.011	0.115	0.000	0.000	0.046	0.038	0.037	-0.565	-0.568	-0.568	-0.568	-0.052	-0.020				
29-01	0.014	-0.018	0.205	0.117	0.097	0.000	0.000	0.039	0.106	0.071	0.316	0.371	0.371	0.371	-0.123	-0.116	0.000	0.000	0.000	0.000

Figure S24. See "STII 366" file: table sheet.

Figure S25. See "STII 366" file: graph sheet (The entire year values for two indicators are represented).