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ReVegIH – Equilibrium Modelling of Re-Vegetation Impact on Hydrology Tool

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CSHC Database

Priority Zones

Vegetation Suitability

$$\frac{ET}{P} = \frac{1 + w \left(\frac{E_o}{P} \right)}{1 + w \left(\frac{E_o}{P} \right) + \left(\frac{E_o}{P} \right)^{-1}}$$

Research Papers

Stakeholders

Tool



报告内容 Topics



- 目的 **Objectives**
- 系统设计思路 **System design considerations**
- 实施方法 **Methodology**
- 编程环境 **Coding environment**
- 用户界面 **The graphical user interface**
- 系统功能 **Functionalities**
- 软件包装 **Software finishing up**





目的 Objectives

为流域管理和水保规划人员提供空间模拟工具
Provides spatial scenario modelling capabilities for stakeholders to better manage the environment

- 快速直观的模拟林草覆盖变化引起的径流变化
Simulates impacts of different re-vegetation schemes on runoff and evapotranspiration (ET);
- 确定了重点植树区范围，并提供了38种植被的空间适宜性
Identifies revegetation priority zones and the suitability of 38 vegetation species for planting in the CSHC.

给有关部门和管理人员提供提供地图和相关信息
Provides CSHC maps and met datasets

- 土地利用图 Landuse map
- 植被适宜性图 Vegetation suitability map
- 多年平均降水量图 Precipitation map
- 数字地形模型 DEM
- 重点植树区图 Re-vegetation priority zone map



系统设计思路 System design considerations



软件设计的基本要求

Certain boundaries had been set for the tool in the initial stages of its design

- 中英文对照 Bi-lingual: to reflect the fact that it is an output of an international cooperative project, it must be a single version with both English and Chinese on its user interface, not two separate single language versions;
- 简单易用 Easy to use: given that the target users are likely to have limited computer skills, ReVegIH needed to be a straightforward, user-friendly software;
- 独立运行 Standalone: it must not require other software packages to support its functionality, especially basic GIS functions.
- 单机运行 CD distributable: the tool will be distributed on CDs, installed locally, rather than a web-based application.
- 对机器要求低 Low hardware requirement: it runs on an ordinary computer, does not require fancy equipment.





实施方法 Methodology



实施方法

Methodology of implementing requirements

- 数据自动导入 Data auto-load
All data required to work with the ReVegIH tool are loaded automatically while the application starts up;
- 数据预处理 Data pre-processing
Wherever possible static data have already been processed and packaged with the software;
- 不同精度地图 Different data resolutions
Two different resolutions of data are used in the system to fit on one CD for distribution;
- 简化用户操作 Minimum user operations while maximise functions
Button click and sidebar dragging.





编程环境 Coding environment

微软 Microsoft Visual Studio .Net

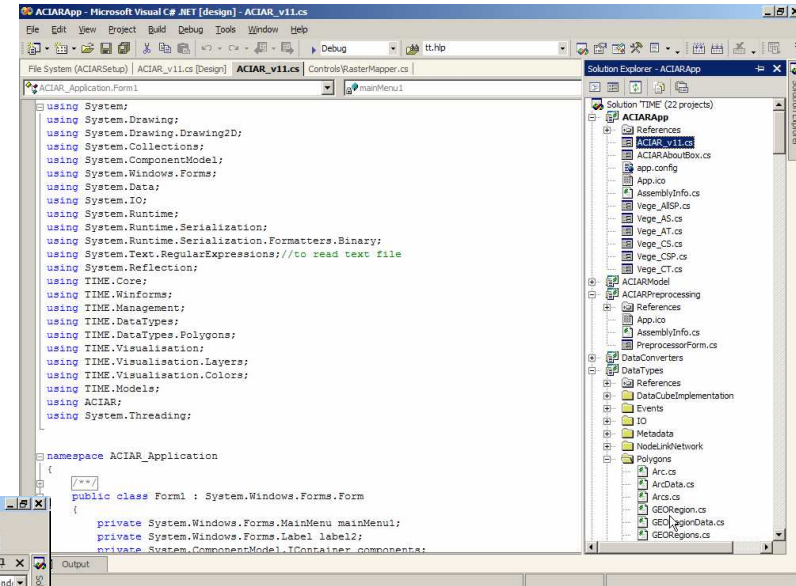
- 兼容中英 Multi encoding choices
- 多种编程语言 Multi languages - C# used
- 需要 Requires Microsoft .Net Framework Redistributable installed to run



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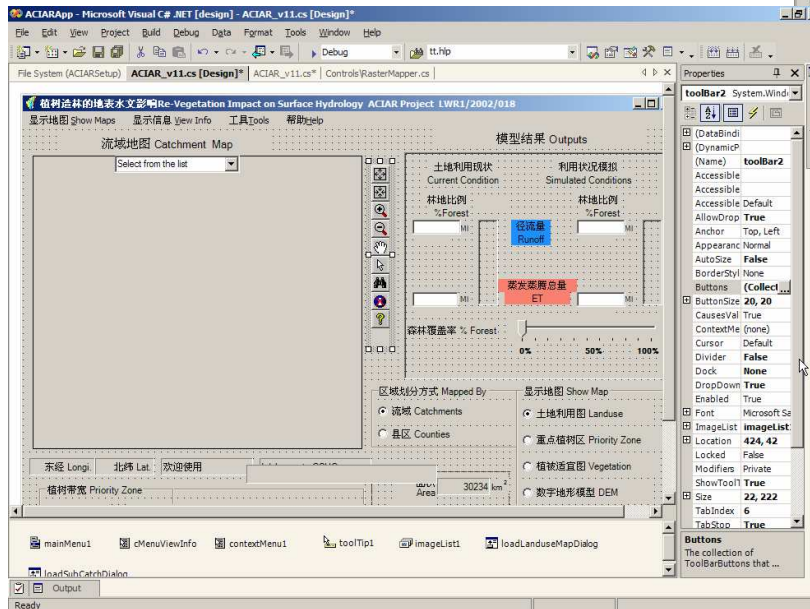
模型公式 Algorithm

- 张橹模型 The background algorithm is a generalised model developed by Lu Zhang



隐性建模环境 TIME

- 隐性建模环境 The Invisible Modelling Environment framework
- 建模平台，丰富的组件 A model developing environment which makes use of the reflection and customisation capability of .NET to support advanced model processing tools with lots of components



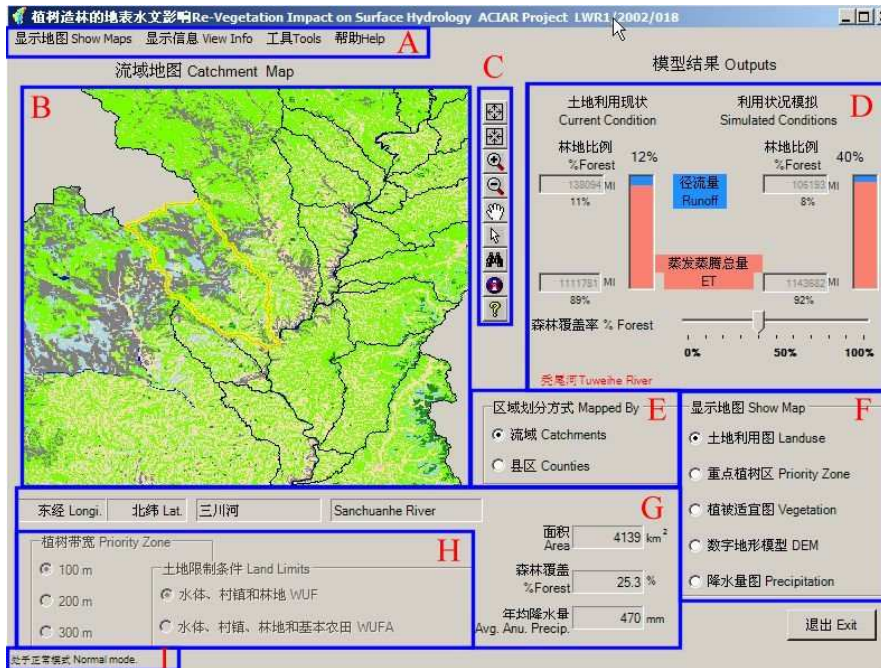


用户界面 the Graphical user interface



可以将用户界面按功能分成9个区域

The ReVegIH GUI can be segmented into 9 parts based on their functions



- A: 菜单区 Menus
- B: 地图显示区 Map area
- C: 工具选择 Tools selection
- D: 模型结果显示区 Modelling output area
- E: 区域划分方式 Mapped By
- F: 显示地图 Show map
- G: 鼠标所在区域的相关信息 Information of mouse over region
- H: 重点植树区 Priority settings
- I: 模式显示 Mode status bar



系统功能 Functionality



地图显示功能 **Functionality: Display maps**

- 选择一个专题地图和一个矢量地图来显示。共有5个专题地图和两个矢量地图
Choose a raster map and a vector map to display. There are five maps and two vectors to choose from
- 地图可以缩放、漫游，选择区域，进行查询
The maps displayed are selectable, zoomable and searchable
- 菜单式和纽扣式两种选择方式
Two methods (menus and radio buttons) are available



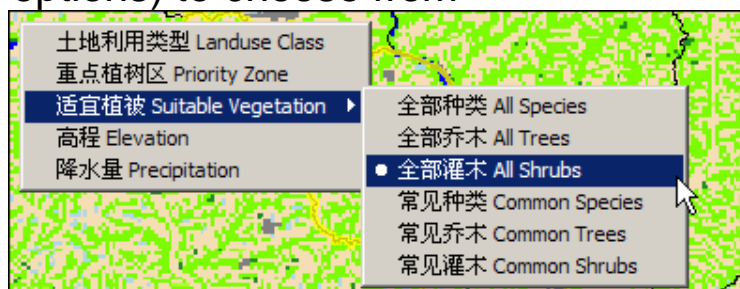


系统功能 Functionality

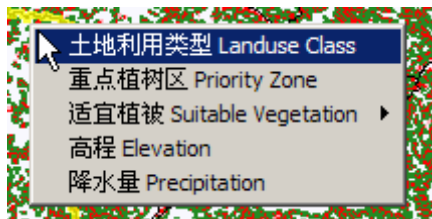


信息显示功能 **Functionality: Show information**

- 选择一种地图信息来显示，共有5种地图（10种信息）
Choose a type of map information to show. There are five maps (10 options) to choose from



- 由用户决定是否显示信息
Users have the choice to show / hide information
- 显示的信息不必跟显示的地图一样
The info shown does not have to be from the map shown
- 基本菜单和弹跳菜单两种选择方式
Two methods (menus and popup menu) are available





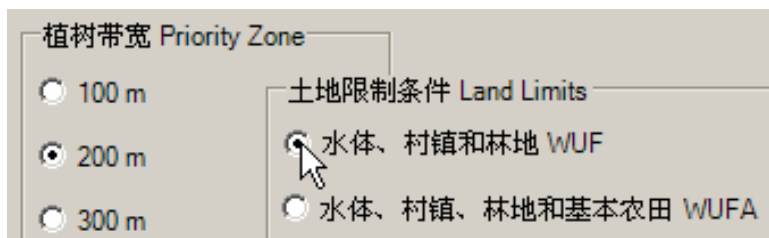
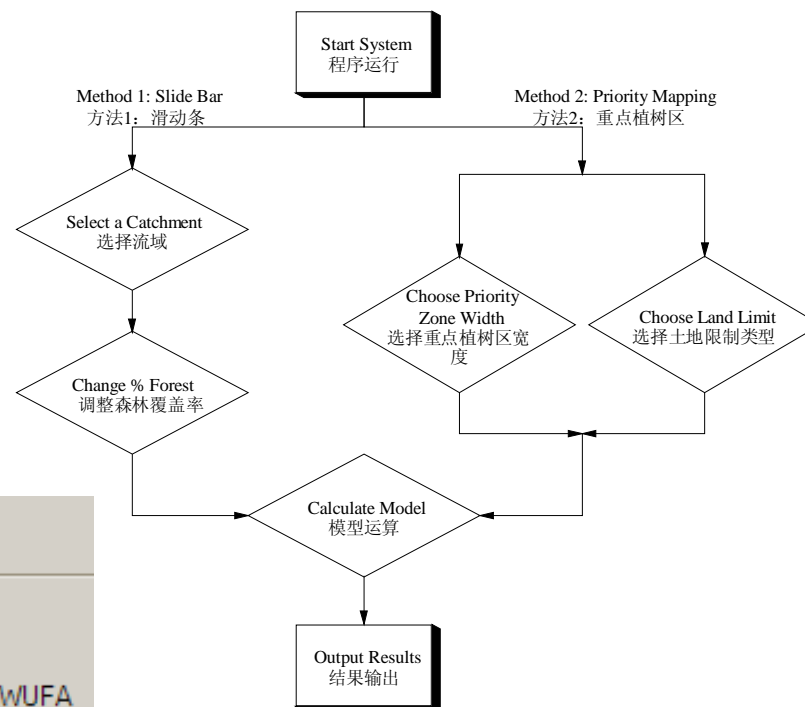
系统功能 Functionality



情景模拟功能 **Functionality: Simulating re-vegetation schemes**

- 方法 Method 1: 显示土地利用现状图，则先选定一个流域，再使用滑动条来调节该流域的森林覆盖率
Selecting a catchment or county boundary and defining the percent forest cover using a slide bar

- 方法 Method 2: 如果显示重点植树区图，则需要选择一个宽度，再选择一个土地限制类别（WUF 或者WUFA）
Selecting an appropriate priority zone width and land limit combination in which the forest cover is automatically defined





系统功能 Functionality



植被适宜性信息 **Functionality: vegetation suitability info**

- 研究区共38种植物的适宜性
Suitability of 38 species for every single pixel
- 分成6类易于查找
Categorized into 6 groups for fast information access

全部种类 All Species
全部乔木 All Trees
全部灌木 All Shrubs
常见种类 Common Species
常见乔木 Common Trees
常见灌木 Common Shrubs

宜 OK?	灌木名 Shrubs
Yes	山毛桃 Amygdal...
No	黄刺梅 Rosa xanthina
Yes	荆条 Vitex negundo
Yes	狼牙刺 Sophora davidii
Yes	酸枣 Ziziphus jujuba var. spinosa
No	虎榛子 Ostryopsis davidiana Decne
Yes	紫穗槐 Amorpha fruticosa
Yes	沙枣 Elaeagnus angustifolia
Yes	柠条 Caragana microphylla
No	沙柳 Salix psammophila
No	怪柳 Tamarix spp
Yes	乌柳 Salix cheilophila Schneider
Yes	沙棘 Hippophae rhamnoides
No	文冠果 Xanthoceras sorbifolia

- 第一步选择38种植物 38 trees and shrubs selected for the CSHC re-vegetation scheme
- 生成38个单个植物的适宜性地图 One suitability map per species
- 叠加，转换成一张地图 Combined to generate a single suitability map





软件包装 Software finishing up



中英文双语安装 **Two installation languages**

- 中文 Chinese and
- 英文 English

中英文双语帮助 **Bi-lingual help file**

- 中文 Chinese and
- 英文 English

自运行演示文件 **Self running demo**

- 可执行程序 executable file (.exe)
- 电影格式 movie format (.avi)

附有相关组件 **Packaged with essential components**

- .NET framework
- 数据接入组件 MDAC (Microsoft Data Access Component)
- 运行模型所需基本数据 All data required to run the tool

附有文献 **Packaged with relevant documents**

- 张膺模型论文 Lu's paper
- 五种课题技术报告 5 tech reports

分发软件 **Distributing CDs**

- 赠给有关部门 300 Installation CD will be distributed to local managers





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谢谢

Thank You

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