



# Training on AccessMod



3- 1

## Training on AccessMod

# From facility mapping to population coverage estimation using GIS

Steeve Ebener, WHO

Manila, Philippines

24-25 April 2008



# Session 3 - Introduction to AccessMod 3.0



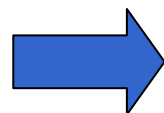
## Session 3 – Part 1

- Objective
- History
- Examples of use



## AccessMod - Objective

AccessMod has firstly been developed in order to provide users with a tool for measuring and analyzing access to care and geographic coverage (availability + accessibility) as well as proposition for scaling up if necessary

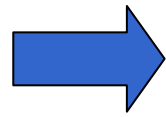


Take advantage of the advanced capacities offered by GIS software in the areas of spatial analysis and spatial modeling

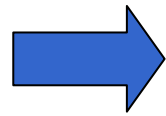


# AccessMod - Objective

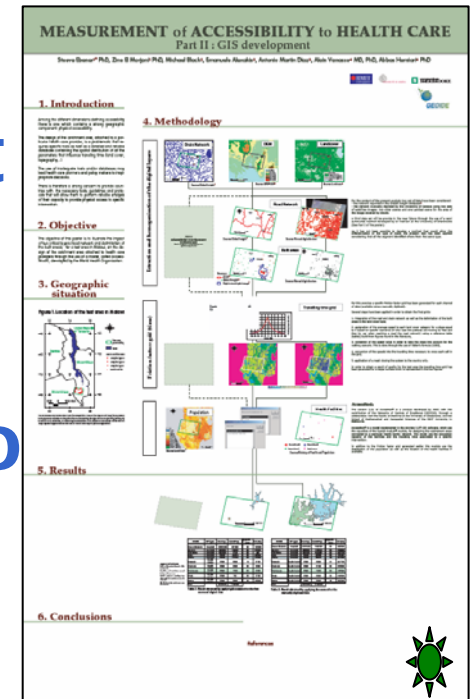
It has also been developed in order to illustrate:



that 5 km buffers are a very limited approach when it comes to defining the extend of a catchment area



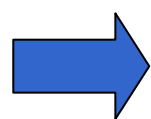
the influence of the input data on the results when applying spatial models and therefore the need to focus on content more than tools





## AccessMod - Objective

Primarily developed to answer the specific needs of some WHO programs (Cost-effectiveness analysis and Coverage capacity modeling) the tool as gradually demonstrated its utility at the country level



**Development of different versions**



# AccessMod - History

## Major steps

- 2002: Start of the activity within the context of the of a cost-effectiveness analysis**
- 2003: Need to develop an automated module as the manual process becomes too complicated => Development of the script that will be used to create an extension to be plugged to ArcView. Receive some funds to insure its development.**



# AccessMod - History

## Major steps

**End 2003: First results obtained through the application of the extension**

**March 2004: Decision on the name for the extension: AccessMod**

**October 2004: First publication based on the use of AccessMod (ESRI health user conference) **



# AccessMod - History

## Major steps

- 2005: Release of version 2.1 of AccessMod to the public (including documentation, sample data set)**
- 2006: Release of version 2.2 of AccessMod (current version on the ESRI Arcscript page)**
- 2008: Finalization of version 3.0 of AccessMod (presented here, still not released)**

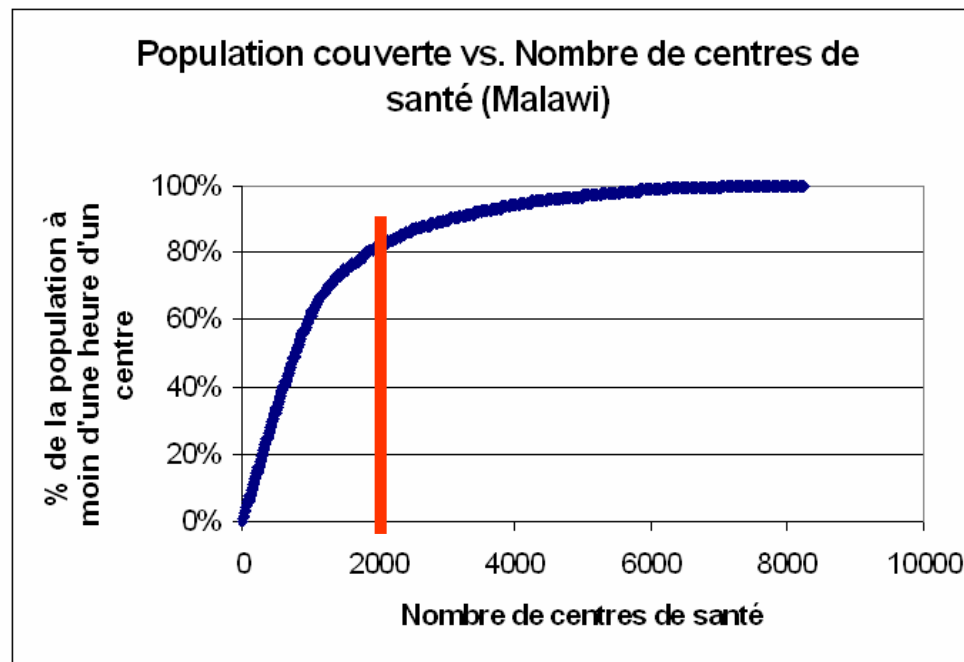
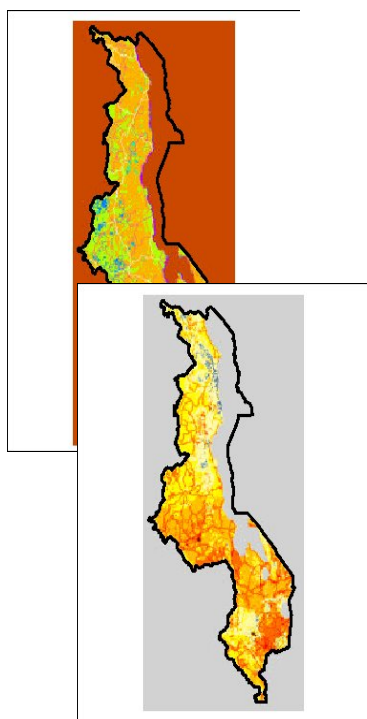


# AccessMod – Examples of use

## Before being named

Country: Malawi  
travelling time: 60 minutes  
Occupation capacity: 5893 patients

Type of infrastructures: Health centers  
HF network unknown



8246 Health Centers



Cost effectiveness analysis

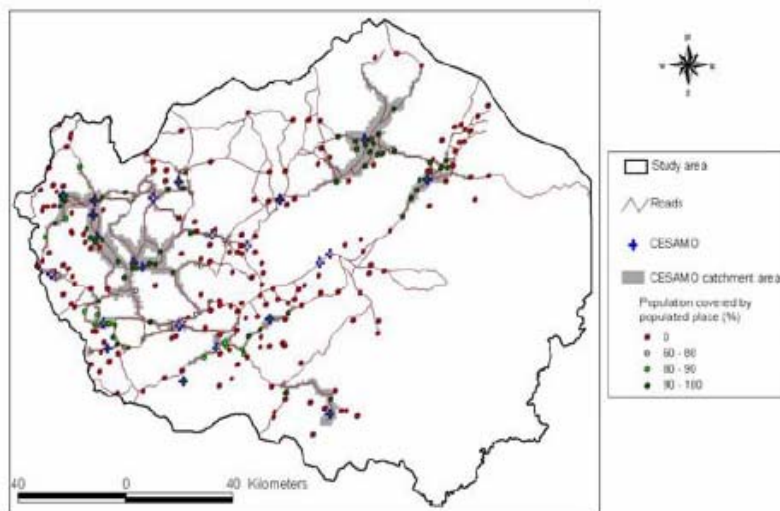


# AccessMod – Examples of use

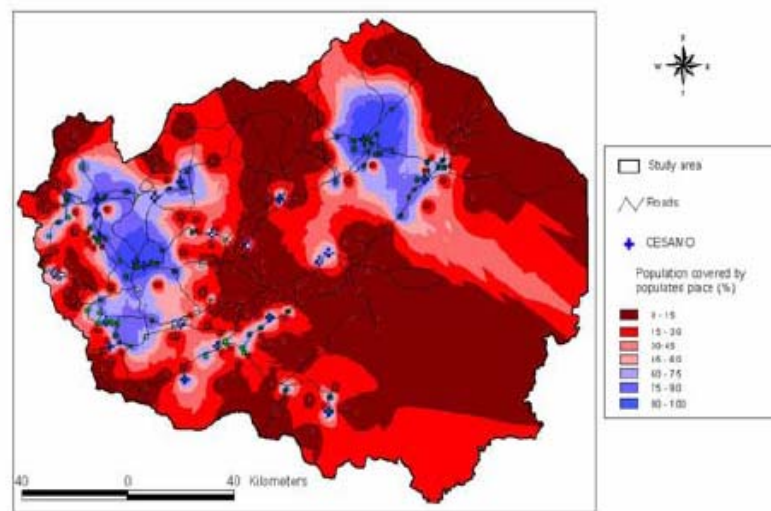
## Version 2.1- 2.2

Country: Honduras (1 health region)  
travelling time: 60 minutes  
Different occupation capacity

Type of infrastructures: Cesamos  
HF network known



a) Populated places classified according to the percentage of population having access to a CESAMO



b) Accessibility surface created by interpolating the classified populated places



Geographic Coverage analysis



# AccessMod – Examples of use

## Version 3.0

Country: Malawi  
travelling time: various  
Occupation capacity: various

Type of infrastructures: ART sites  
HF network known

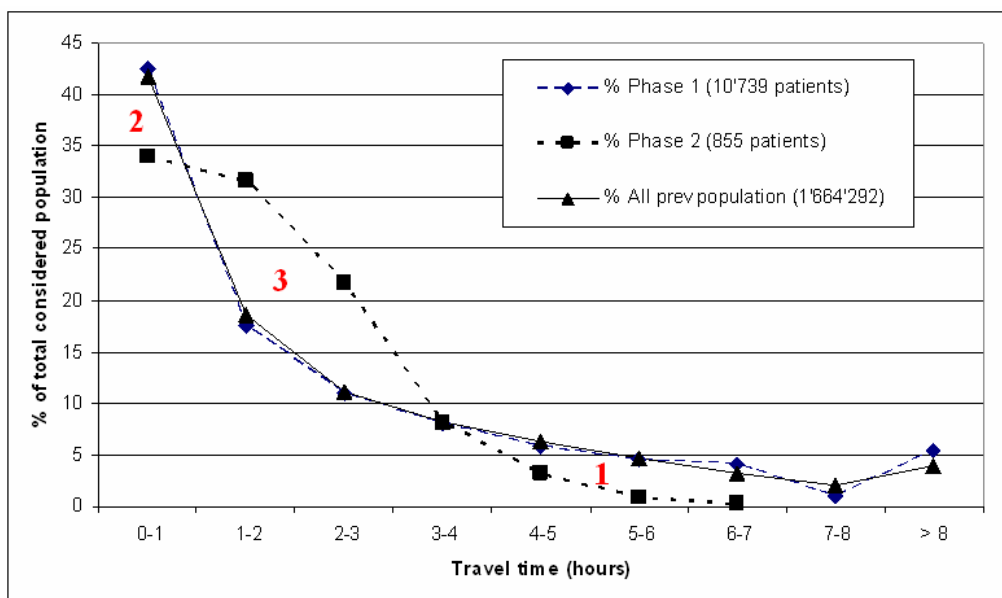
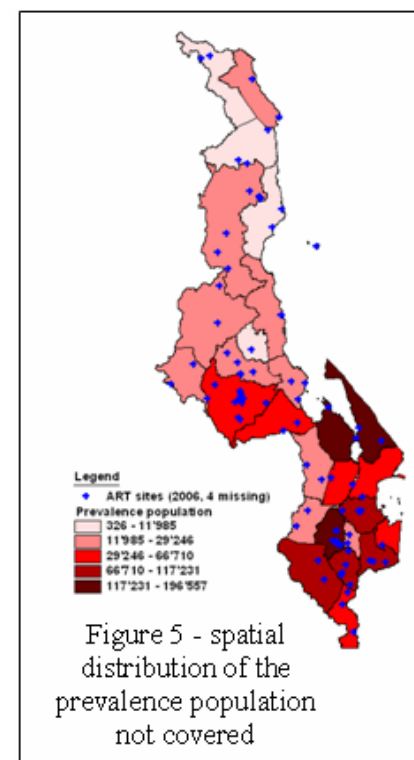


Figure 3 - Percentage of total considered population according to travel time with: % All prevalence population = distribution of the all prevalence population; % phase 1 = distribution of the 10'379 patients who started on ART in 2006; % phase 2 = distribution of the 855 patients interviewed in the context of the patient exit survey



➔ Equity in access analysis



# Session 3 - Concepts, method and functionalities of AccessMod 3.0



## AccessMod 3.0 – Concepts

Build on the concepts presented during day 1:

- availability coverage
- accessibility coverage
- geographic coverage

+ some additional concepts:

- scaling up
- cost effectiveness
- patients movement
- catchment areas



# AccessMod 3.0 – Concepts

## Scaling up

“Scaling-up” is the process of reaching larger numbers of a target audience.

- ➔ Important component
- ➔ AccessMod produce the distribution of the population which is not covered by the existing health facility network and the possibility to identify potential sites for scaling up this network



## AccessMod 3.0 – Concepts

### Cost effectiveness

1. *"It is more cost effective to place a facility in an area which is highly populated as it will reduce travel time for a large population and ensure the sustainability of the infrastructure"*

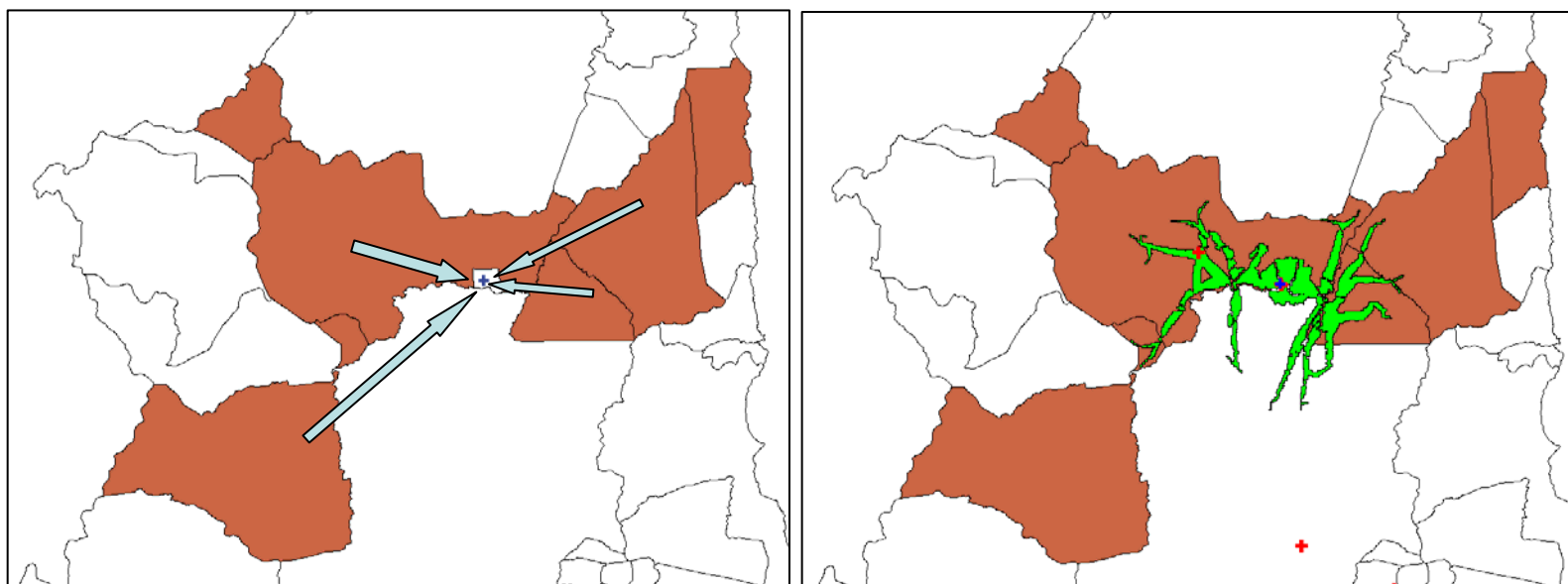
➔ **Scaling up**



# AccessMod 3.0 – Concepts

## Patients movements

1. *"patients are crossing internal boundaries when looking for care"*





## AccessMod 3.0 – Concepts

### Patients movements

2. *"the environment and the transportation media influence the time taken to reach care"*

- ➔ Consider land cover, slope, roads and rivers
- ➔ Allow to combine 3 transportation media: walking, car (bus), bicycling + boat to some extent



## AccessMod 3.0 – Concepts

### Patients movements

3. *"the environment and the transportation media influence the time taken to reach care"*

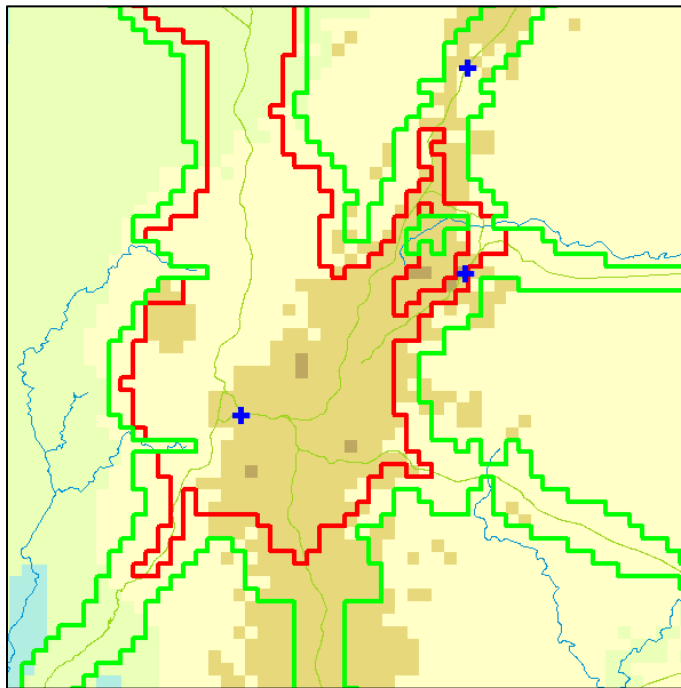
- ➔ Consider land cover, slope, roads and rivers
- ➔ Allow to combine 3 transportation media: walking, car (bus), bicycling + boat to some extent
- ➔ Consider anisotropic movements



# AccessMod 3.0 – Concepts

## Catchment areas

1. *"the extension catchment areas Can overlap"*





# AccessMod 3.0 – Concepts

## Catchment areas

2. *"the extension of a catchment area change depending on the direction of movement (to/from)"*



**Physical Accessibility to health care: From Isotropy to Anisotropy**



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**Abstract**

Public health and health care are important concerns for developing countries and access to health care is a significant factor that contributes to a healthy population. In response to these issues, the World Health Organization (WHO) has been working in collaboration with a number of academic institutions in Australia, Switzerland and Canada on the development of methods and models for measuring physical accessibility to health care using several layers of information integrated in a Geographic Information System (GIS). Two products have resulted from this work: Accessibility and MARR, an outline of these two products is presented here, specifically emphasising the transition from modelling the geographic extent of catchment areas using an isotropic function to the use of an anisotropic approach.

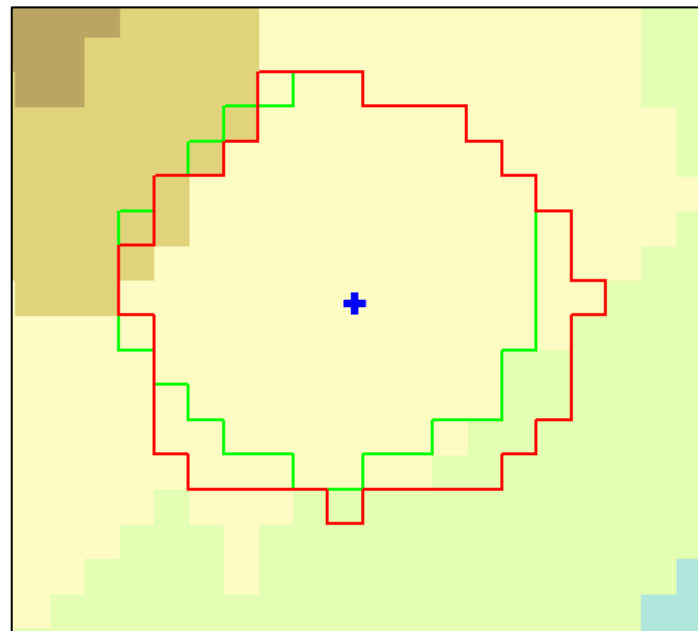
**Background**

Access to health care is an important component of an overall health system which has a direct impact on the burden of disease that affects many countries in the developing world. Measuring accessibility to health care therefore contributes to a wider understanding of the performance of health systems within and between countries which facilitates the development of evidence based health policies.

Accessibility to health care is concerned with the ability of a population to obtain a specified set of health care services. In this context, geographic accessibility, often referred to as spatial or physical accessibility, is concerned with the complex relationship which exists between the spatial separation of the population and the location of health care facilities.

The use of Geographic Information Systems (GIS) for the measurement of physical accessibility is well established and has been applied in many areas including retail site analysis, transport, emergency service and health care planning (e.g. Wilks et al 1998, Albert et al 2003 and Cronley & McLaughery 2002). In the context of health care planning, the ability of GIS to identify the geographic extent of a health facility catchment area, which corresponds to the area which contains the population utilising the facility, is a particularly important analytical capability.

To   
From 





## AccessMod 3.0 – Concepts

### Others

1. *"Some area might not be suitable for locating an health facility but population might be living there"*

- risk prone areas (flood, tsunami)
- military zone or natural parks

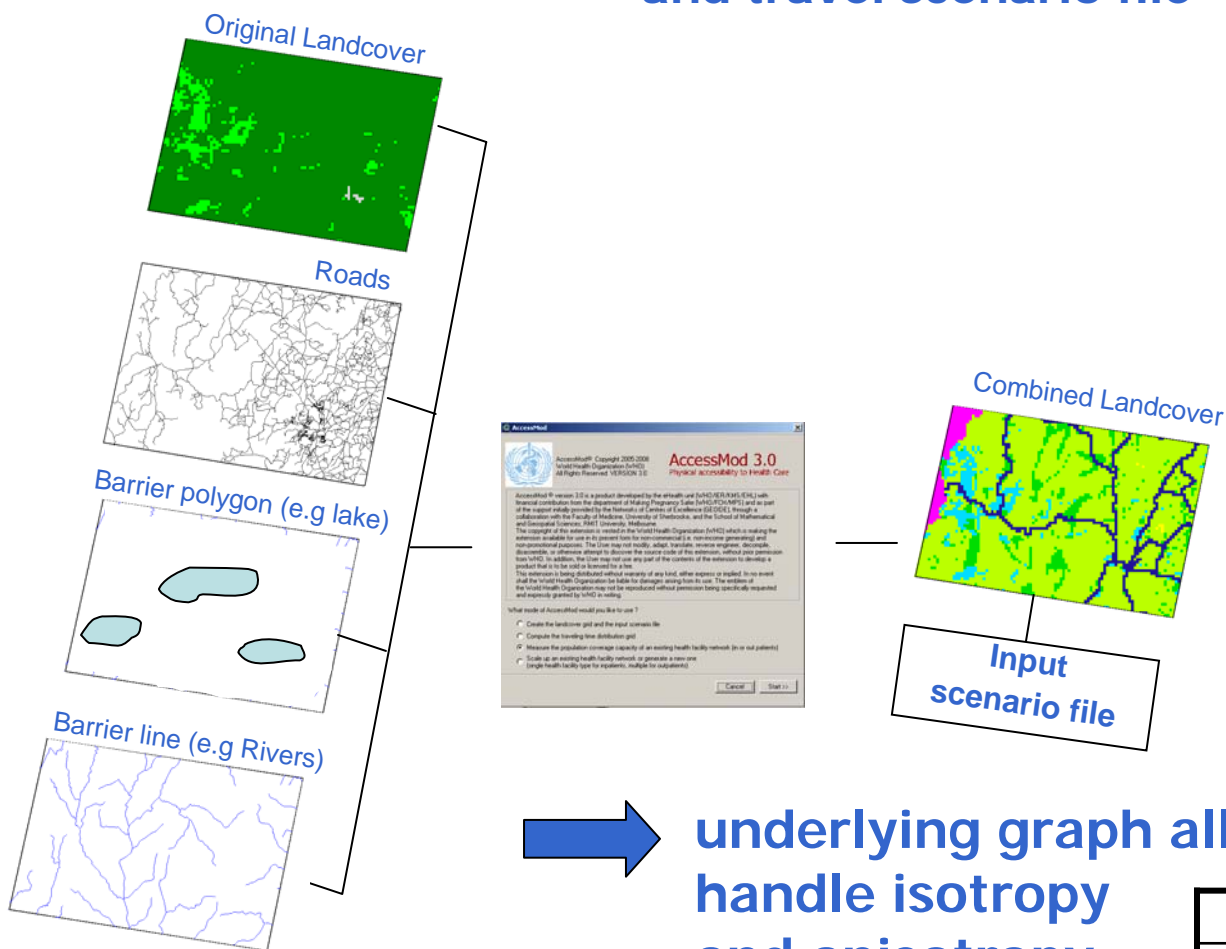
➔ possibility to use an "excluded areas layer when scaling up"



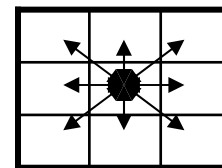
# AccessMod 3.0 – Method

## 1. Creation of the combined landcover and travel scenario file

**New !**



underlying graph allowing to handle isotropy and anisotropy





# AccessMod 3.0 – Method

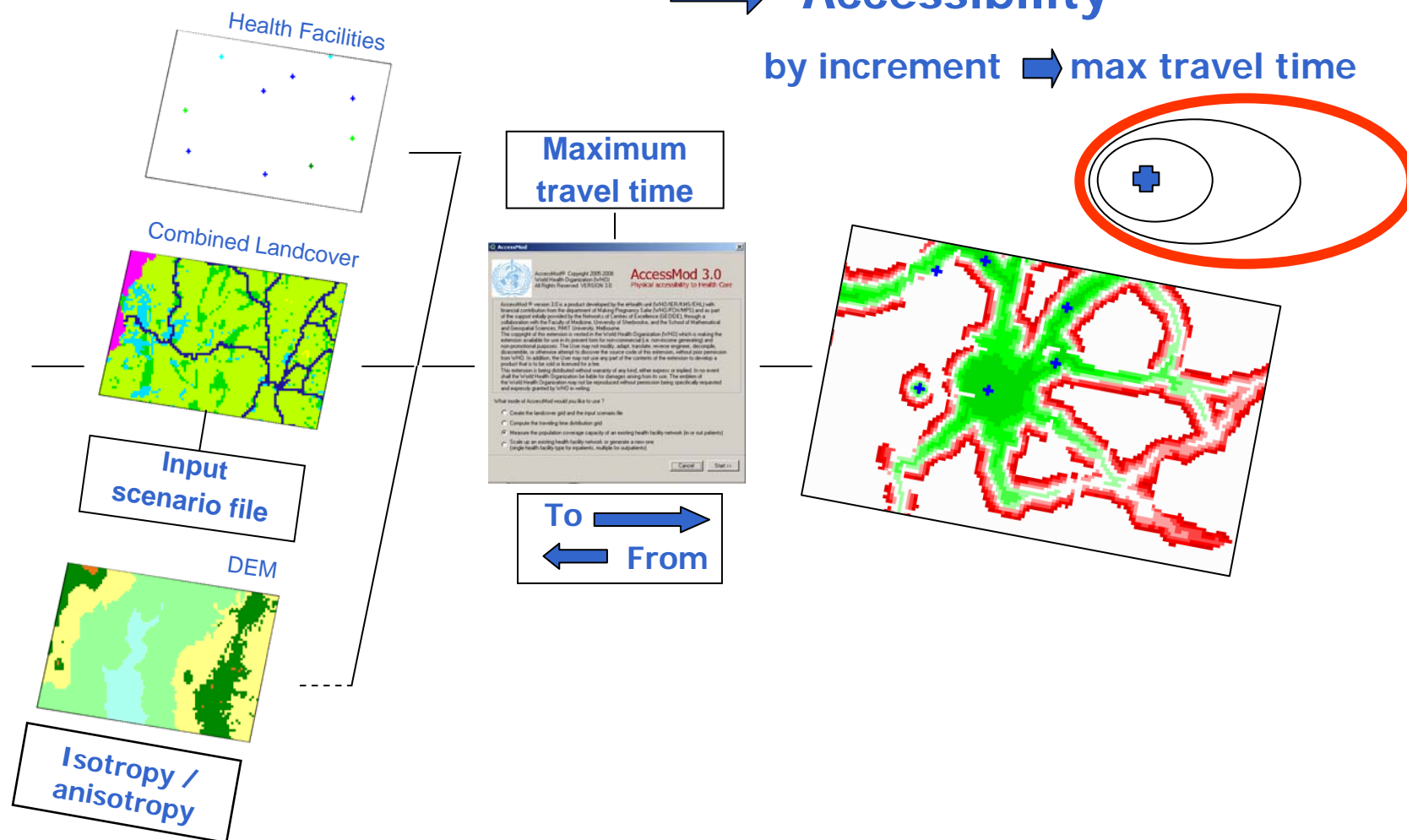
## 2. Computing of the travel time distribution grid



Accessibility

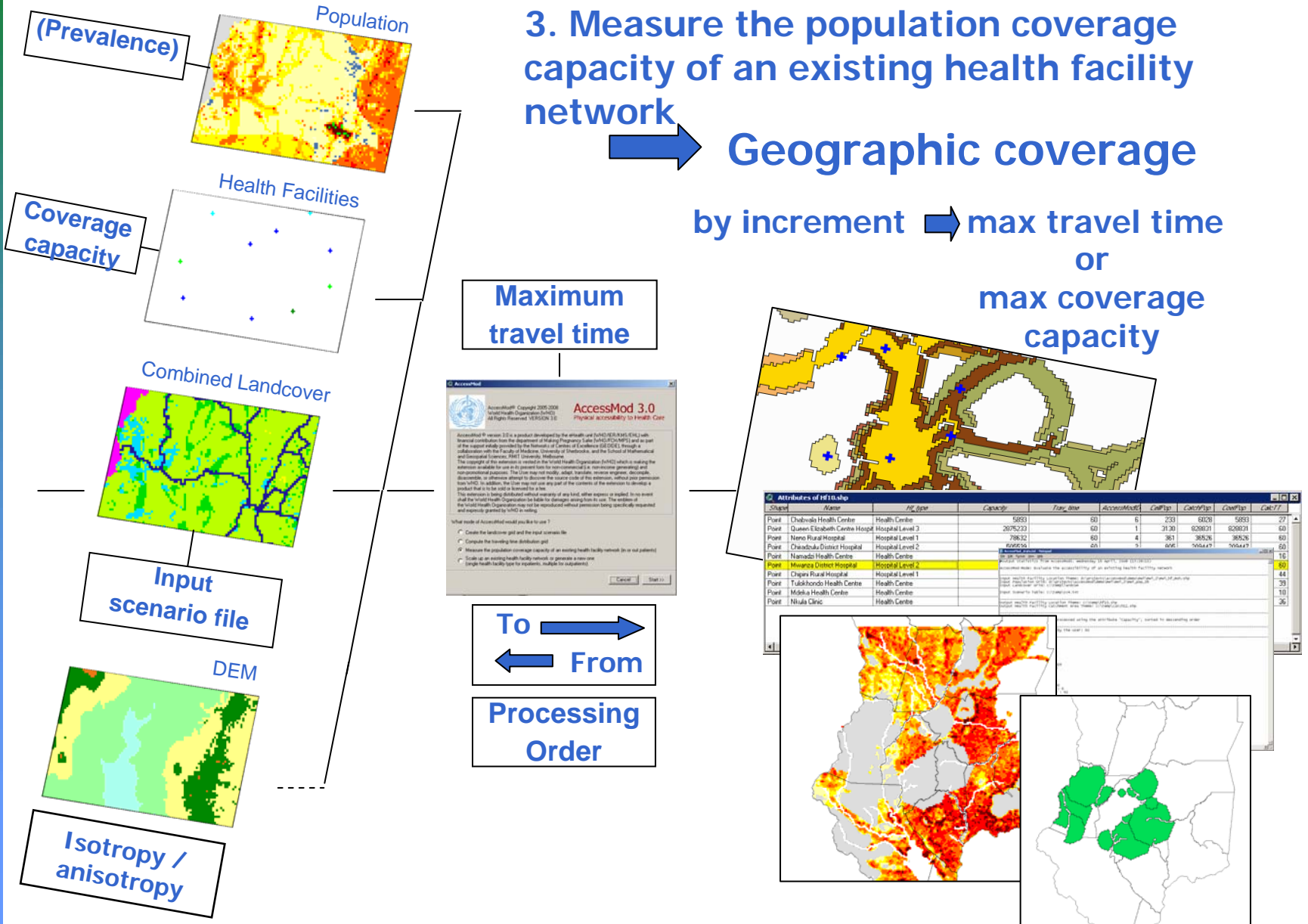
New!

by increment → max travel time





# AccessMod 3.0 – Method



3. Measure the population coverage capacity of an existing health facility network

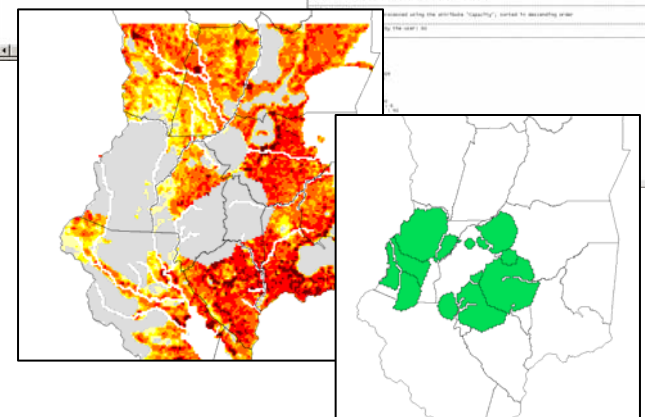


Geographic coverage

by increment → max travel time or max coverage capacity

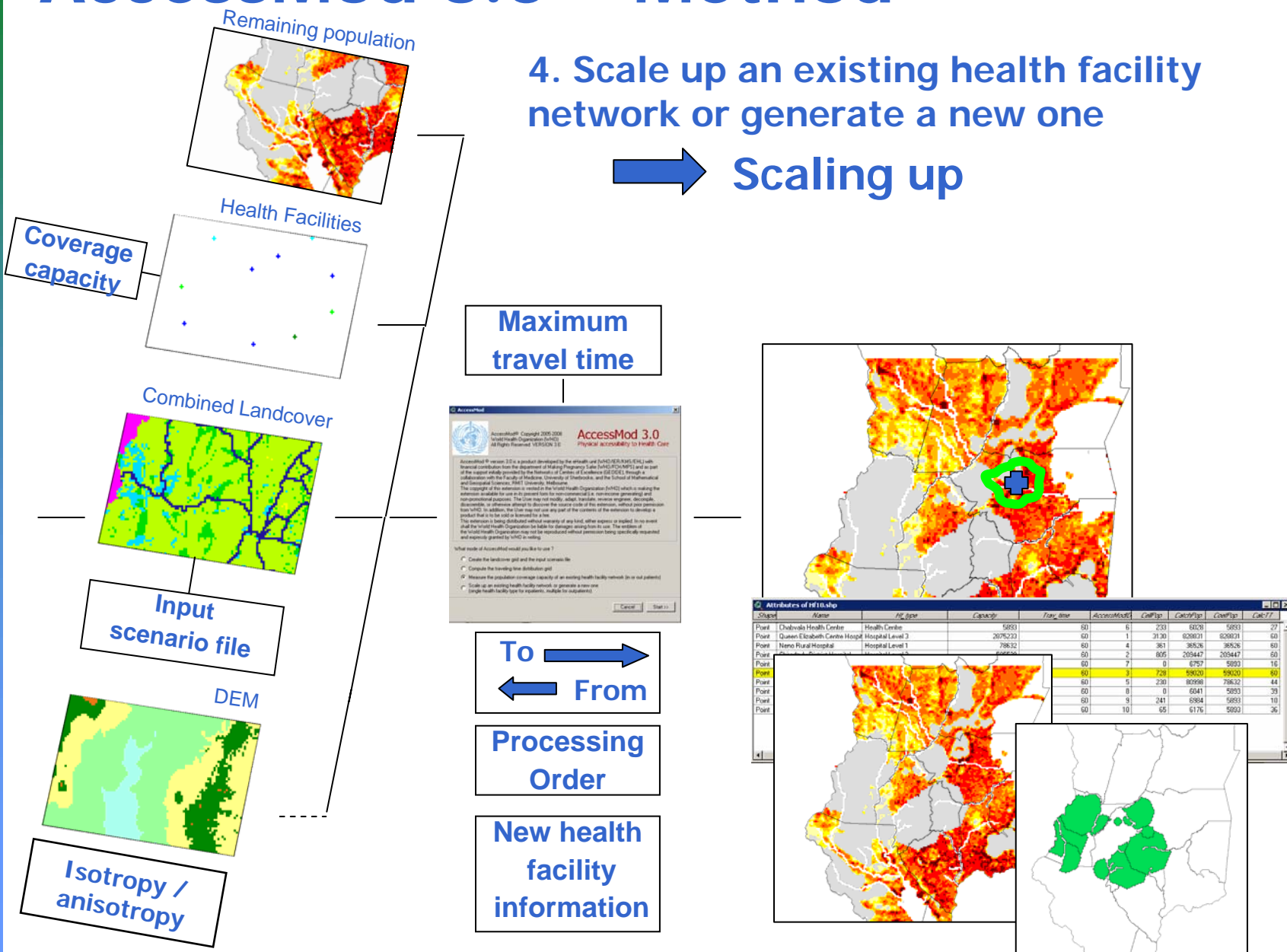


ID	Name	Type	Capacity	Travel time	AccessMod	Coverage	Coverage	Coverage	Coverage
Point	Chobuvula Health Centre	Health Centre	5000	60	5	250	6000	5000	27
Point	Queen Elizabeth Centre Hospital	Hospital Level 3	200000	60	1	2130	60000	60000	60
Point	Nano Rural Hospital	Hospital Level 1	78632	60	4	361	36526	36526	60
Point	Chianabula District Hospital	Hospital Level 2	60000	60	5	600	60000	60000	60
Point	Nanavato Health Centre	Health Centre							16
Point	Mivavava District Hospital	Hospital Level 2							60
Point	Chapara Rural Hospital	Hospital Level 1							44
Point	Tubuhondo Health Centre	Health Centre							29
Point	Makaka Health Centre	Health Centre							10
Point	Niula Clinic	Health Centre							26





# AccessMod 3.0 – Method



## 4. Scale up an existing health facility network or generate a new one

### Scaling up

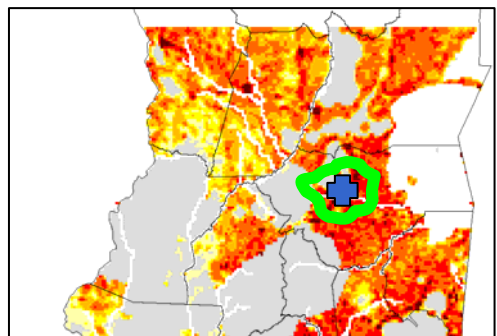
Maximum travel time



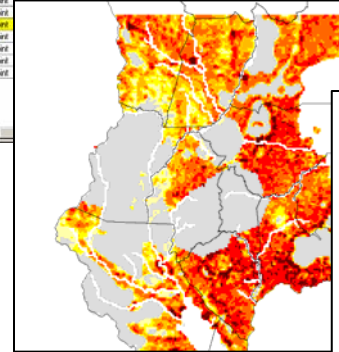
To From

Processing Order

New health facility information



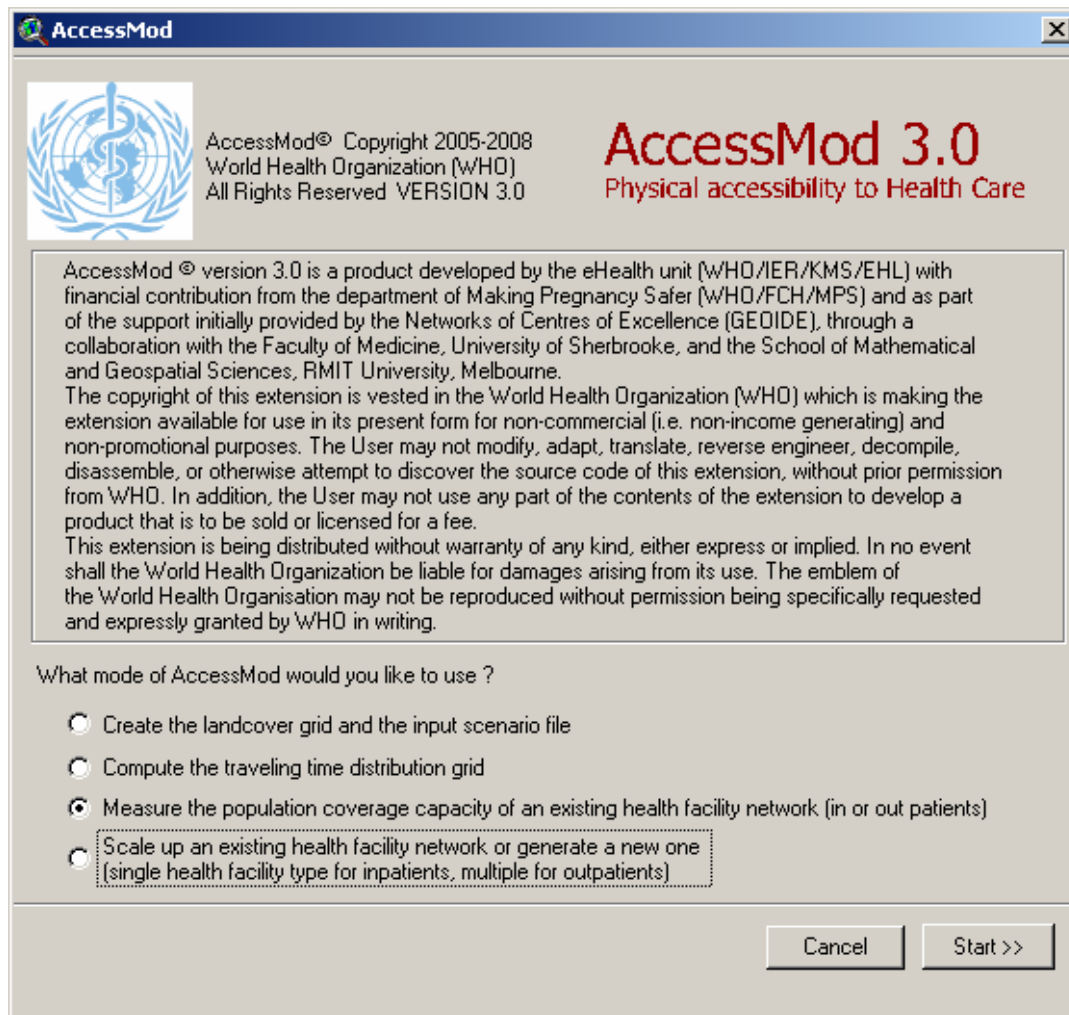
Shape	Name	Fac_type	Capacity	Travel_time	AccessMod3.0	CovType	Capacity	CoverType	CovType	CovType
Point	Cheboale Health Center	Health Centre	5053	60	6	233	6028	5053	27	
Point	Queen Elizabeth Centric Hospital	Hospital Level 2	2075223	60	1	2130	820821	820821	60	
Point	Bueno Rural Hospital	Hospital Level 1	78632	60	4	361	38526	38526	60	
Point			646564	60	2	895	209447	209447	60	
Point				60	7	0	6757	5053	16	
Point				60	3	728	19820	19820	60	
Point				60	5	280	82098	21632	44	
Point				60	0	0	6241	5053	39	
Point				60	9	241	6984	5053	10	
Point				60	10	65	6176	5053	26	





# AccessMod 3.0 – Functionalities

## Demo





## AccessMod 3.0 – Limitations

- Extension to ArcView 3.2
  - ➔ associated cost
- Require accurate and of quality data to produce good results
  - ➔ data might not be available
  - ➔ **can support its improvement**
- Might require some important computer capacity (RAM) depending on the size of the areas and resolution of the raster data (see page of the user manual)