Making of area mesh by ALIS

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1. Preface

This study report is a complementary report of "The consideration for making area framework in ALIS" which is written for a working level statistician who responses on conducting an area sample survey by ALIS. Although ALIS has a function for making an area framework by area meshes, it is made the area mesh according to the defined rules. This study report shows these definitions with a view to supporting depth of understanding on ALIS operation.
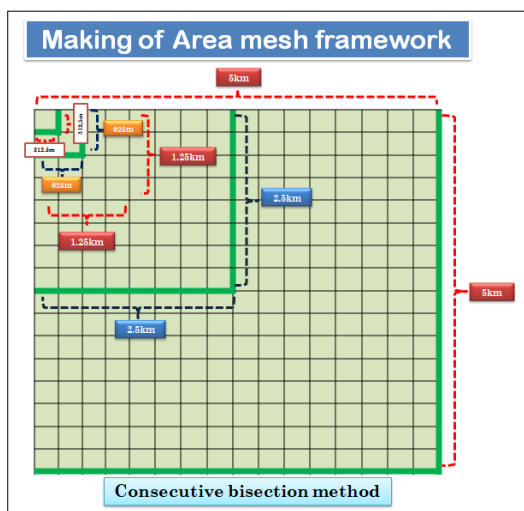
2. Making method of area mesh

Figure 1

As you know, ALIS makes 4 kinds of meshes which are 5 km and 2.5km mesh as the wide mesh, 600m and 300m as the area mesh. The area mesh is made by a consecutive bisection method from a basic 5Km wide mesh. Therefore, sizes of area mesh become 625m and 312.5m by each mesh as a theoretical distance. These meshes are named as 600m mesh and 300m mesh by each for convenience. Because, the area of area mesh itself does not give any influence to an estimated area value in areas estimation of ALIS.

$$Y = \frac{\sum_{i=1}^{n} xi}{\sum_{i=1}^{n} yi} \, y \quad \text{at the time of} \quad y = \frac{\sum_{i=1}^{n} yi}{n} \, N$$

xi = Area in "i" number of this year

yi = Area in "i" number on the monitor

ALIS estimates the agricultural land area by using this formula above, however, the size of area mesh is not in the formula element. In fact, a sample data itself is important for data estimation, the area mesh size which it becomes a determinant of sample data does not influence to the estimated area. So you can consider easily, it will result of a same answer regardless of any area mesh size.

For example, if you change the size of area mesh from 300m to 600m, the number of N becomes quarter besides the value of yi becomes 4 times in above formula.

In addition, we have to consider the Google Map has the difference distance by the difference of latitude even if it uses a same scale. And ALIS also is compelled to accept a method of the difference distance by difference latitude exactly.

3. The function of wide mesh

Needless to say, the area mesh is used for the sample unit of area sample survey. On the other hand, I'm questioned on ALIS mesh method, "Why wide mesh is needed as a function". Here I digest the function of the wide mesh.

- *The functional improvement of screen operation;* For example, visible judgment operation of are mesh can treat collectively by the wide mesh.

- *The recognition unit on province borderline;* I explain this detail below. ALIS recognizes the borderline existence by the wide mesh.
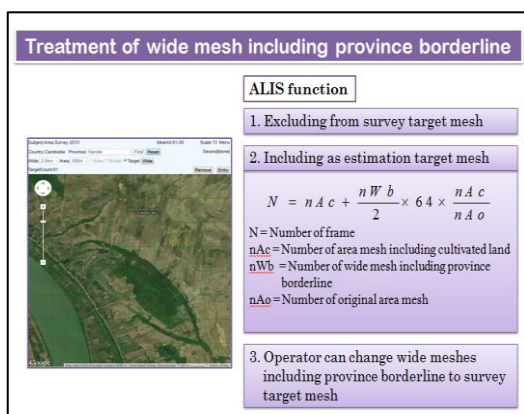

Figure 2

- *The utilization of another sample survey;* I was much more aware of this task for wide mesh because I had a clear intention to use wide mesh as a framework for others sample survey.

4. The treatment of area mesh placed on a borderline

The treatment of area mesh included a borderline has to be decided from a stand point of survey object and a standpoint of estimation object.

4-1 The standpoint of survey object

Although the borderline in ALIS is a province borderline where it becomes a unit of survey and estimation, meanwhile, it has a possibility to become a national borderline on a province where having a borderline with neighboring countries. The notional borderline should be treated carefully in terms of political and social. The avoidance of trouble occurrence with enumerator entering into this area has to be assumed at principle of system design.

Therefore, ALIS excludes [note1] meshes including the borderline from survey objective and performs only borderline recognition by wide mesh（2.5Km, 5Km meshes. This is an avoidance measure which the area mesh where is located within a few hundred meters from national borderline become the survey objective in case of conducting borderline recognition by area mesh. This will enable that all area meshes within the wide mesh including borderline are excluded from the survey objective area mesh. The wide meshes which are excluded from the survey objective displayed by black color on the screen.

4-2 The standpoint of estimation object

However, if all meshes including the borderline are excluded from framework as estimation objective, it cannot estimate a right whole value. Therefore, ALIS counts the area mesh including borderline of ½ as estimation objective. This idea is designed based on the supposition which even if there are difference of area rate with in or out of borderline of each wide mesh, the number of area mesh become 1/2 by aggregating. In addition, it needs to be reflected the rate of area mesh including a cultivated land for total area mesh within a borderline to the wide mesh including a borderline because the estimation objective framework is made by area meshes including a cultivated land. Therefore, ALIS counts

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[note 1] The excluding of survey objective in ALIS means that these target meshes become the exception from the first sample meshes on ALIS sampling function.

the number of area mesh in estimation objective framework by below formula.

The number of area meshes including the cultivated land within a borderline + the number of area meshes including the borderline [note2] *×1/2 × the number of area mesh including the cultivated land within the borderline / the number of total meshes within the borderline*

4-3 Mesh conversion function

As it is described above, a treatment of borderline in ALIS excludes a wide mesh including the borderline from survey objective as the basic specification. However, it would be assumed that if it excludes the wide mesh which is including of the borderline from survey objective, almost all of the area become out of survey subject depending on a province area, it poses a problem for the area estimation.

Therefore, ALIS has the function for indicating the area mesh within a wide mesh witch could be recognized as an out of survey objective is re-recognized as a survey objective area mesh by the area mesh. Specifically, the conversion of mesh recognition is operated[note3] by the operation mode on screen switches to "Border" and left click a target mesh. The area mesh which is recognized as a survey objective mesh changes from black color to original map color.

5. Mesh identification data number

Mesh ID is attached in order of upper left→lower left→upper right→lower right in parallel with making of area framework.

Case of wide mesh
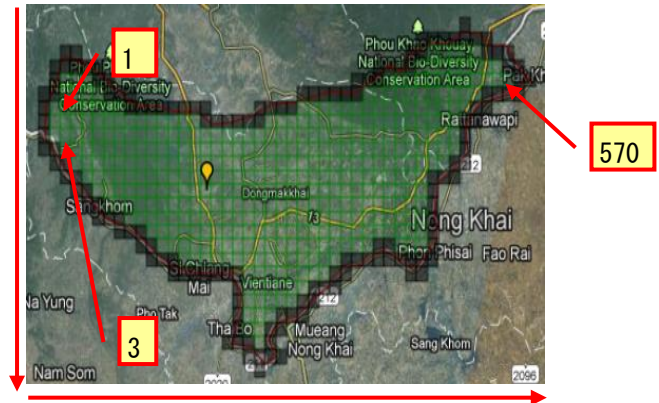

Case of area mesh

[note 2] The number of area meshes including borderline change according to the selected a wide mesh size and an area mesh size because ALIS recognizes the existence of borderline on the wide mesh. For example, in case it would select 5 km mesh as a wide mesh and 300m mesh as the area mesh, it would count 64 area meshes for one wide mesh.

[note 3] ALIS Operation Manual, 3-2-2 Map mesh registration, Procedure 8