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**Forest management optimization considering biodiversity, global warming and economics goals**

**Workshop at: Gorgan University of Agricultural Sciences and Natural Resources (GUASNR),**

**By Peter Lohmander, November 2017**

**Acknowledgements:**

This workshop has been made possible thanks to a kind invitation from Vice-President for Research and Technology, PhD Mohammad Hadi Moayeri, Ministry of Science, Research and Technology.

**Preparations before the workshop starts:**

Lecture room preparations

It is important that the lecture room has PC projector and necessary cables, screen etc.

It is also important that the lecture room has WiFi connection to the internet.

It is also important that the lecture room has a large whiteboard (at least 3 meters wide and one meter high) and pens with different colors. A large ruler (one meter length) makes the graphs and drawings better.

Individual preparations

Preparations to be made before the excercises:

During the excercices, we will use QB64.

It is important that the participants have access to laptops where QB64 has already been installed.

This software can be downloaded for free from this link: <http://www.qb64.net/>

It is also good if the participants have already installed Lingo.

Here is the link: <http://www.lindo.com/index.php/products/lingo-and-optimization-modeling> . During the excecises, it is sufficient to have a simple version, which is free, of Lingo installed. Of course, for more advanced problems, a more advanced version is better. Advanced versions of Lingo can however be very expensive.

In the end of this document, you find the ”Workshop references”.

These references contain central theories and methods that will be discussed and used in the sessions. In the schedule, you find the references that are connected to the different sessions. All references may be downloaded from the internet. Please download the references as soon as possible and store them in your computer since internet disturbances may occur some days.

**Schedule**

|  |  |  |
| --- | --- | --- |
| #1. | Saturday, 11 November, 10.00 – 12.00  References: 7,8,13,14,15,16,19,20,23,24,26 | Lecture:  **Forest management optimization when production economics, global warming and biodiversity are considered.** |
| #2. | Saturday, 11 November, 13.00 – 15.00  References: Case 3 | Afternoon excercise session in computer lab:  **Forest management optimization with consideration of production economics, the global warming problem and biodiversity.** |
| #3. | Sunday, 12 November, 10.00 – 12.00  References: 2,4,9,10,11,21,28 | Lecture:  **Economic forest management optimization under deterministic and stochastic conditions. Introduction to analytical and numerical methods including deterministic and stochastic dynamic programming. Optimal adaptive rotation forestry under risk.** |
| #4. | Sunday, 12 November, 13.00 – 15.00  References: Case 1 | Afternoon excercise session in computer lab:  **Harvest optimization via stochastic dynamic programming.**  **Case 1: Rotation forestry.** |
| #5. | Monday, 13 November, 10.00 – 12.00  References: 1,3,5,6,12,17,18,22,25,27,29 | Lecture:  **Economic forest management optimization under deterministic and stochastic conditions. Dynamic population growth and differential equations. Optimal adaptive forestry under risk using continuous cover forestry methods.** |
| #6. | Monday, 13 November, 13.00 – 15.00  References: Case 2 | Afternoon excercise session in computer lab:  **Harvest optimization via stochastic dynamic programming. Case 2: Continuous cover forestry.** |
| #7. | Tuesday, 14 November  References: 1,…, 29, Case 1,2,3 | Panel presentation:  **Should a forest be optimally managed or develop without control? Dynamic consequences for biodiversity, global warming and economics.**  (The presentation is connected to the Caspian forest policy discussion. The panel presentation is based on the theories and methods described during the sessions #1. - #6. Hence, the participants in the sessions #1. - #6. should be well prepared for #7.) |
| #8. | Wednesday, 15 November | Lectures to Students.  Meeting with Dept. of Agricultural Economics. |
| #9. | Thursday, 16 November | Excursion to the Caspian Sea and a Mud Volcano close to Turkmenistan. |

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The following literature and presentations will be used as background to the workshop sessions. In the schedule, the references of relevance to each session are printed.

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