Sub-Global Assessment Network

Assessing ecosystem services for informed spatial planning in forested landscapes in Sarvelat & Javaherdasht in Northern Iran

The Final SGA Network mentoring scheme experience report

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Content

Introduction

Ecosystem services (ES) mentoring scheme is a capacity development activity which has been implemented and funded by Sub-Global Assessment (SGA) Network. It aims to support early career scientists to conduct their ES assessments through establishment a mentoring relationship between them and their trainers who are selected among experienced researchers working in the mentioned field. This report indicates a summary of an ES assessment process in a forested landscape which has been carried out by Mr. Ardavan Zarandian from Iran as a representative of The Iranian Department of Environment (DOE) and University of Tehran and also as a trainee whom is being mentored by Dr. Himlal Baral, a scientist from Center for International Forestry Research (CIFOR), which is located in Bogor, Indonesia.

The mentee is an environmental planner who has been working for more than 15 years in DOE as environmental education expert and also as a deputy manager of the Sustainable Development and Environmental Economy Bureau in recent 8years. At present, he is a PhD student of University of Tehran in the field of environmental planning and works on the subject of ecosystem services modeling and mapping in forested landscapes. Although he is a rather long time career in the field of the environment, but as ES is a rather new approach and concept in Iran, which has not already been practiced sufficiently in the country , he is considered as an early career whom is new to/have no substantive prior experience in the field of ecosystem assessments.

The mentor (Himlal Baral) is a scientist within the Forests and Environment program of CIFOR. His background is in sustainable forest management and current research interests include spatial assessment and mapping of ecosystem goods and services in forested and production landscapes for landscape-level planning and decision making. He obtained his PhD from Melbourne School of Land and Environment at the University of Melbourne, where he investigated various approaches for quantifying and assessing trade-offs between provisioning and regulating services in multi functional landscapes in south-eastern Australia. Prior to joining CIFOR, he worked as a Forester, Spatial Analyst, Resource Planner and Forestry Consultant in both public and private sectors in Asia and the Pacific. His several scientific papers have been published by different prestigious journals associated with ES studies.

This report has been written to reflect the experiences and benefits which the mentee acquired during the scheme. As Iran is a developing country with very low experiences on ES assessment and also there are so limited possibilities to access related data and even find qualified mentors to learn from, this mentoring scheme, without any exaggeration, had been an occasional fortune and opportunity for the mentee.

The report has been divided into three sections as below:

Section 1, the background, illustrates general, Iran's status of ES assessment and economic valuation as well as the challenges or technical shortcomings we face, introduces the study area and its importance and finally the goal and objectives which are followed by our assessment and planning in the framework of the mentoring scheme.

Section2, the mentoring experiences, explains the below points which expected by SGA officials to be reported:

- The extent to which learning objectives were achieved.
- How any new capacity is being, or will be, used in a current or upcoming assessment process.
- A summary of activities undertaken and contact time between the mentor and mentee.
- A brief financial report of how the mentoring funds were utilized.
- Plans to continue the mentoring relationship beyond 31st October 2014.

At last, section3 is a summary about the first output of the mentoring activity which has been acquired from conducting a qualitative ES assessment process in the study area.

It should be mentioned that, as we outlined objectives and the associated work plan very comprehensive and aim to ensure a continuous mentoring relationship, at first, a rapid, qualitative ES appraisal was done as a possible activity under SGA mentoring scheme in short time (31st October 2014). The supplementary parts of our assessment are being followed and will be continued as the beyond October 2014 collaborative activities which is leading to a quantitative and economic valuation of ES for policy implication.

Section1

Backgrounds

1. Iran's status of ES assessment and economic valuation

Like many other developing countries, assessment and economic valuation of ES, is not a well practiced field in Iran. Taking into consideration the gravity of economical and social problems related to environmental degradation and caused by over depletion of the natural resources and discharging of a huge amount of contaminants into the nature, the need for acquiring the essential new techniques and approaches for calculating the real value of ES and estimating the costs of pollution on them is felt more than ever in recent years. Considering that, ES assessment and valuation is a fairly new branch of science in the country and not many experiments have been performed in this field, environmental policies and plans in Iran, usually encounter the following shortages:

- Lack of an appropriate integrated framework to enable assessors to create a linkage between socioeconomic and ecological dimensions. This shortage leads to one-dimensional sectorial environmental plans and policies which only consider the internal environment of the protected areas and ignore the surrounding external lands where the main forcing drivers of change are located.
- Lack of economic value of environmental resources and underestimating the real value due to ignore about ecosystem functions and the flows of services they provide. Often, only some imprecise market prices of natural stocks are noticed during the planning and decision making process and it is not possible to conduct a real environmental costs and benefits analysis due to this shortage.
- The results of environmental assessments are not enough accurate because they are more carried out based on subjective methods in the absence of ES approach which considers fundamental spatial aspects of landscapes including scale, structural composition and patterns in conjunction with temporal variables such as driving forces of change and different scenarios under an integrated framework.

As different environmental problems are dramatically being increased in different part of the country and the quality of the natural ecosystems has been visibly decreased during recent decades, various environmental laws and

regulations have been ratified, including the article 59 of the Fourth Five-Year Development Plan (2004-2008), which clearly states the requirement of applying economic valuation for biodiversity and other environmental services. But despite of passing 10 years from conducting valuation projects, the results are not satisfactory and the article has not been completely executed due to technical shortages and insufficient experiences in the field. In such situation one possible solution is using the existing under growing international experiences on ES assessment and valuation. Therefore, exchange data, learning from abroad and transferring robust methods and techniques for more accurate measurement of different categories of ES are some important solutions that can build and promote technical capacities in upcoming environmental assessments inside the country. In this regard, the SGA mentoring scheme has been an existing valuable opportunity and we want to conduct an ES assessment based on an ES integrated approach and the results of such activity will introduce this approach within the country as a helpful manner to overcome the related shortcomings and challenges.

2. Study area and its importance

Forest ecosystems in Northern part of Iran which are called Caspian- Hyrcanian (CH) forests, provide vital services other than wood production, including soil conservation, water balance, as well as recreation for both local and national communities. However, despite of their unavoidable contribution in social wellbeing, the status and trend of such services have not been assessed due to lacking appropriate data, tools and an overall neglecting of the ES approach in environmental assessments in Iran.

There are few similarities in the physiognomic and taxonomic aspects between CH forests and European and American deciduous forests. Fertile soil, suitable precipitation and temperate climate cause that some species such as "*Fagus orientalis*", "*Quercus castaneifolia*", "*Alnus glotinosa*" and "*Aecr velotinum*" can reach 50 meter height and 3 meter diameter at breast. The Caspian forest areas are among the most unique and splendid biomes of the world. The CH forests have high moisture content, so forest trees are host to many epiphytes such as mosses, ferns, lichens, mistletoes and some flowering plants. Soils are productive and rich in minerals and organic matter.

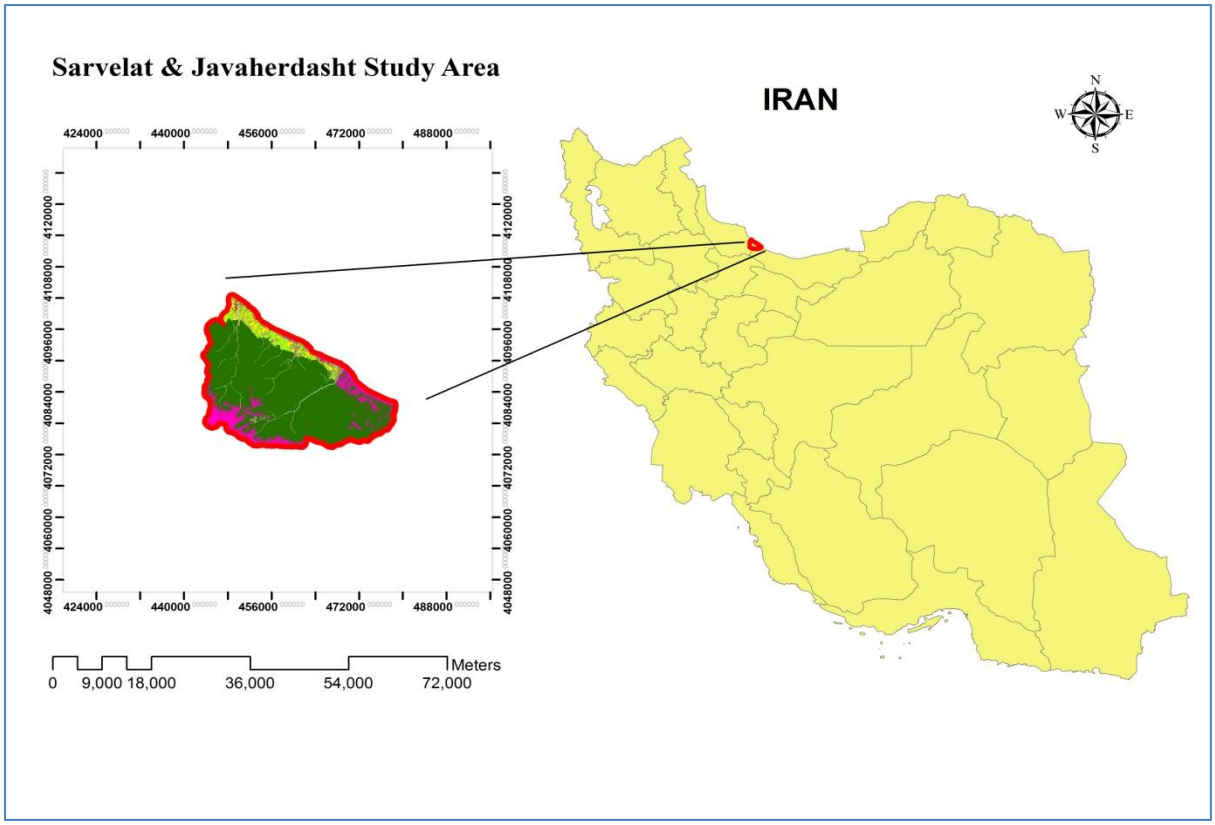
As, these forests cover a wide area inside three provinces of Guilan, Mazandaran and Golestan about 1.9 million ha, we selected a pilot site which is

called, *Sarvelat and Javaherdasht* and situated within the boundaries of two first mentioned provinces.

The pilot area covers an area about 558 km^2, is a mountainous, forested landscape in the northern part of Iran and alongside the southern coastal line of the Caspian Sea with a unique natural characteristics, where no ES assessment have been already carried out by SGA network and even other research center.

Elevation in the area ranges from -27m in the north, alongside the Caspian sea coastal line, to more than 3600m above mean sea level in the southern Javaherdasht. The Mean annual temperature and rainfall are respectively 14° centigrade and 1150 mm which causes a humid temperate climate in the area, although the climate is very cold at high elevations during the winter. The existence of a complete, latitudinal range of CH forests from floodplains at low elevation areas to semi dense, dense forest and summer pastures towards more elevated parts are considered as natural characteristics of the study area.
In terms of socioeconomic**,** two important adjacent urban areas are: Ramsar at the southeastern and Chboksar at the southern part of the study area with a population of 28954 and 10646 people respectively. Also, there are about 180 rural points with a population that ranges from 0 to more than 2000 people. The majority of the local people are farmers. Also, due to the unique natural attractions of the area, they are also active in providing different services for tourists including accommodation, tourist tips, restaurant and so on. However, It is obvious that they are interconnected closely to the natural ecosystems for their subsistence.
As the area is a selected pilot of the ancient *CH Forests*, it is considered as a unique and very important area in terms of biodiversity and various ecosystem services that it provides for a wide range of global to local beneficiaries. Some main evidences for such claim are as below:

- The area contains remnants (refugia) of the broad leaf forests that once covered most of the North Temperate Zone, 25 - 50 million years ago, in the early Cenozoic Era.
- These forests disappeared during the Pleistocene ("Ice Ages") When the Europe covered by ice, but were alive only here because of the proximity to temperate climate of the Caspian Sea.
- At the end of frozen, plant species of CH forests immigrated to Europe and these forests is mother of European forests.



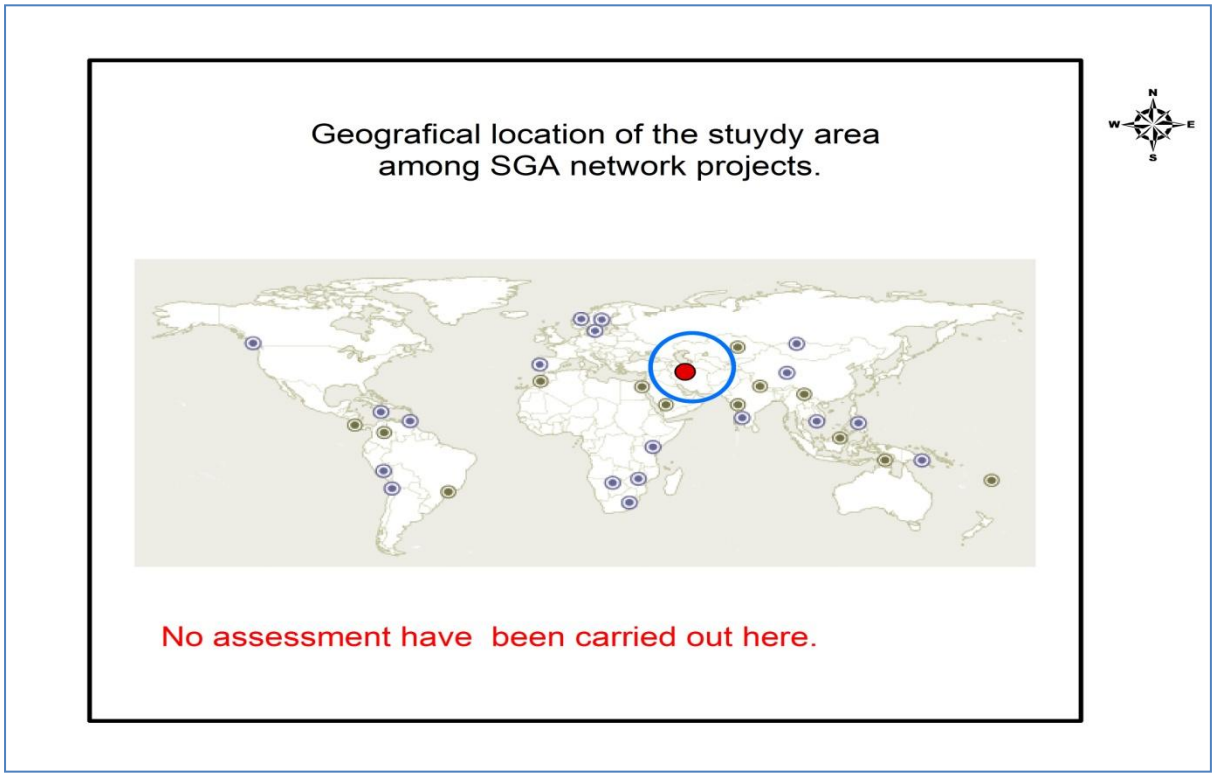


Figure 1- Area of the study

- In addition and in terms of national importance, Iran is a wide arid and semi arid country with a total land area of 1.648.000 Km^2 but so much limited forest covers. Only about 111000 Km^2 is covered by forest and from this amount only 2% is considered as CH temperate forest type. Therefore, assessment and conservation of these type of forest is essential.

Unfortunately, despite of such ecologically importance, these forests are being degraded in recent decades caused by different driving forces including land cover change, wood smuggling and forest inappropriate management. Therefore the government is trying to stop wood extraction and execute restore degraded landscapes through forestry practices but it seems suitable assessments are required as a prerequisite for identification the win-win areas for both habitat conservation and sustaining ES. Although no formal deforestation rate has been announced by the government in recent years, but some experts believe that this type of forest in the northern part of Iran has been declined from 4.3 to 1.9 million hectares during three recent decades.

3. Study goal and objectives

Generally, ES assessment in the study area aims to find out, how sustainable decisions and proper developmental strategies, can be made in forested landscapes through a common language and interactions between ecological and socioeconomic dimensions. It is believed such integration can move us towards an informed developmental planning.

To do this, the below mentioned objectives are followed:

- To outline an informed spatial planning based on: ES Supply, Delivery, Demand, Synergies and trade-offs.
- To anticipate the plausible future based on different scenarios.
- To practice applying and running an appropriate software (InVEST) for mapping, modelling and measurement of the key ecosystem services in forested landscapes

It seems such objectives and practices could help us to forsake subjective environmental assessments in Iran and move towards more quantitative assessments and the results of our pilot project can be introduced and used by other practitioners across the country for different biomes and natural habitats if it would be successful.

Section2

The mentoring experiences

When I applied for the mentoring scheme, I primarily announced my learning objectives as below:

- To learn some applicable methods for identification of the main driving forces of changes in natural forest assets
- To learn more about different temporal and spatial scenarios in related to the past, current and plausible future of an under assessment area.
- To develop an understanding of ecosystem services approach as an integrated socioecological system.
- To practice applying and running appropriate software for mapping and modelling of the key ecosystem services in forested landscapes

I also mentioned that I am going to use what I will learn, in practice to facilitate an ES assessment process in my concerned research area.

If I want to judge about the effectiveness of this mentoring scheme, I should truly express that I have benefitted by it in several different ways:

- **Providing an opportunity to work closely with an experienced guide.** I was keen to work on ES assessment but, I couldn't find a qualified mentor in my country, as ES is a rather new branch of science in Iran. Now, I am constantly in touch with my mentor with common interests.
- **Financial facilitating for a research traveling.** In recent years due to unfavorable economic conditions , research travels has been limited in my country. Mentoring scheme solved the problem.
- **Increasing motivation to continue ES research.** Although ES assessment has already been my favorite, but I was working in a non-continues way before the mentoring scheme. I motivated to work continuously, with more concentration and seriousness, since I developed more communication through SGA network.

Considering the above mentioned benefits, in this section, I have briefly described my experiences and what I learnt by the scheme.

1. **Achievement of the objectives**

After initial discussion with my mentor, I realized some parts of the obstacles which I had already faced in my assessment procedure was due to my knowledge gap on ES approach. So he sent more than 10 published papers by him and his co-workers which I studied them to promote my fundamental knowledge on ES assessment. As, I had not access to these articles in my country, they were very useful for me and I found a common scientific language with my mentor based on the main concepts and principles of ES that I learnt. Therefore , my basically learning objectives achieved to the extent that I become ready theorethically to start my assessment process based on my mentor's guidelines. In this regard, I was familiar with:

- Different kinds and classifications of driving forces of changes in the natural environment including direct and indirect ones which cause changes or trigger the other driving forces that finally cause land conversion.
- Various aspects of physical (spatial) and non physical (temporal) scales and scenarios which are essential to be considered for a robust assessment of ES in a landscape.
- The main existing methods and approach which can be applied in different situation for ES assessment and considering data availability, budget and time.

I also applied my learning in a qualitative ES assessment in practice as an initial phase which could be completed in limited time and also can be continued for more accurate quantifiable measurement based on my future plan of collaboration with my mentors.

In summary I can say the main part of the objectives I had considered for my mentoring scheme have been achieved by the activities I have taken until now, although they will be needed to be completed with more accuracy in the next supplementary phases including quantitative assessment, economic valuation and policy design.

2. ES Capacity building

As it was mentioned before, the mentee has been working in Iranian department of environment (DOE) for 15 years. Based on his observations, there are so many technical and managerial shortcomings in the field of environmental conservation in Iran as a developing country which cause ineffectiveness in related plans and activities. Environmental degradation and pollution has been the result of such trend in recent decades. So there is an urgent technical need in the country for introduction of new applicable approaches and methods for better management of the environment. As due to economical problems in recent 8 years, rapid socio economic development is also another urgent need and even is more prioritized than environmental protection by the policy makers, we need kinds of environmental approach which can be compatible to the economic development. ES approach, is intrinsically an integrated socioeconomic- ecological method which can be applied by environmental planners in Iran and help them to establish links with other developmental dimensions. But at first, the prerequisite capacity should be built in the country, based on it, the approach can be useable by DOE. The mentoring scheme has helped to build a new ES capacity in DOE through the following ways:

- What the mentee has learnt is being transferred to other experts and coworkers in DOE to promote their incentives and stimulate their motivations to apply ES approach and thinking system when they conduct environmental assessments.
- The ES assessment process which is practically done by the mentee under mentor's guidance and the associated manuscripts which will be published , play a role of a demonstrative assessment projects which indicate usefulness and the possibility of appliance of the ES approach in upcoming assessment process in Iran.
- As, Iranian national plan to put economic value on environmental resources has been started about 8 years ago, but the results of the executed projects has not been sufficiently satisfactory, it was suggested by the mentee that the ES approach to be incorporated into the terms of references (TOR) of all economic valuation projects which will be carried out in DOE. Also, based on this suggestion, two new ecosystem services assessment projects are being started associated with two international important wetland sites in Iran which will be executed based

on ES thinking framework that has been released by previous international activities such as MA, TEEB, NCP,etc.

3. Activities taken until now

The activities under the mentoring scheme in this report have been divided into three parts:

- **Activities during June and August 2014,** after the success of the mentee's application was announced by UNEP. These activities are considered as primary work and start of a formal contact with mentor in the framework of the scheme. During this time the mentee trained by the mentor remotely using internet connection facilities including Skype. The aim of this activities has been to provide basic knowledge as well as the minimum data that was needed to start an ES assessment process through common collaboration. The main activities in this framework were as below:
  - Initial discussion on general issues (study area, data availability ….) through emails and Skype.
  - Receiving and studying published papers of the mentor and others for literature review.
  - Selection of a pilot site based on the mentee's explanations about forest ecosystems in Iran.
  - Design of a qualitative study method for conducting a rapid ES appraisal based on interconnection between natural land covers and ES in pilot site. This decision was made because no ES assessment had already been carried out in concerned area and also there was no data to be used for assessment.
  - Production of land cover/ land use map by mentee using satellite imagery and Arc GIS software.
  - Designing expert judgment questionnaires with mentor's guidance.
  - Getting opinions of more than 30 specialists and also local settlers, about ES provision and consumption in the pilot area
  - Sorting, editing of the gathered initial data .

- **Activities during a two week research traveling to Bogor, Indonesia (22 Sep- 7 Oct),** during this time using SGA grant a short time research

and learning travel was possible and we could directly discuss and exchange our initial gathered data for more analysis.
At first week we prepared a common work plan which contain essential actions that should be conducted step by step during our collaboration both in short time under mentoring scheme and in long time to ensure the continuity of our cooperation in the field of ES assessment. Also , the initial data were analyzed based on mentor's redirections . In this regard the required data to write the first manuscript as a qualitative assessment paper was produced and also some GIS output map were prepared based on these analisys.

At second week, as we specified before, the process of writing the concerned manuscript was continued until it was almost ready to be submitted to a journal. Of course, there was still some corrections which was decided to be revised after this trip. As, learning about ES modeling software was another important objective that followed by the scheme, some initial principles of appliance of InVEST as a comprehensive existing software were taught by mentor. As the biodiversity tool of InVEST to identify habitat quality and rarity had been already used by mentor and the result had been published in Ecological Indicators journal (36 (2014) 552– 562), this part of training was very helpful. It was decided , this tools to be applied in our second phase of assessment process which is a quantitative assessment using ES indicators and models.

- **Activities beyond October 2014 (when the mentoring scheme is ended)**, we decided to continue our cooperation on ES assessment beyond the time of the mentoring scheme based on our future work plan which has been described in the next part.

4. The multi stage work plan

One important out put of our direct discussions during travelling to Indonesia has been a common work plan which contains the sub actions which should be followed in the future. Figure 2 indicates 3 specific supplementary stages of ES assessment in our study area, which is begun with qualitative assessment and ended by policy implication and designing PES. The first phase was done

during the mentoring scheme, the second phase is in progress now and the last phase will be followed in 2015.

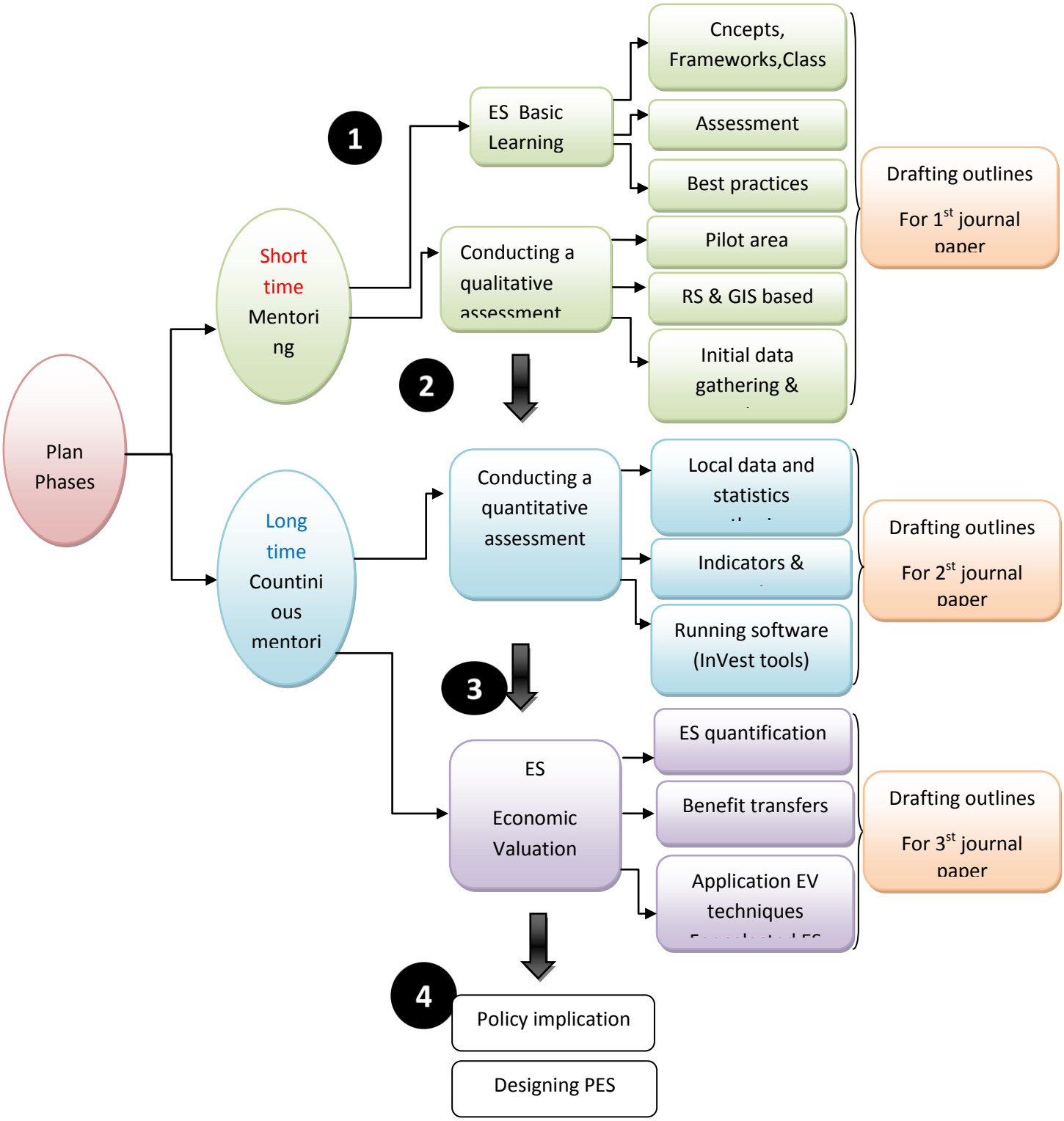


Figure2. the multi stage workplan which has been produced based on mentoring relationship.

5. financial report

Based on an agreement between UNEP/WCMC and CIFOR, a part of allocated fund equal with US$ 1200, has been utilized by CIFOR to cover the mentee's accommodation cost during staying in Indonesia. Also an amount equal with US$ 500 has been paid directly to mentee to cover his subsistence costs. A return economy air ticket also was purchased by UNEP/WCMC. All these cost has been invoiced and announced by CIFOR to UNEP/WCMC.

Section3

Executive summary of ES qualitative assessment in Sarvelat and Javaherdasht forested landscape

As it was specified in mentee and mentor's common work plan for collaboration in the field of ES assessment, the first phase of the work was conducting a qualitative or a rapid ES appraisal. This appraisal, helped that the overall status and trend of ES to be identified in the concerned study area where, no previous ES assessment had been carried out. Here a brief report on executed actions for such appraisal is explained.

1. Study design

To design this rapid assessment, we firstly gathered initial qualitative data, based on expert opinions using questionnaires and community, aboriginal knowledge through direct interviews with selected households. Then the information gathered as described, was combined with land use and land cover information procured from satellite imagery and geographical information system.

2. Study approach

we used a combination of qualitative and quantitative assessment (QQA), as an overall approach because of the limited time and budget and lack of sufficient quantified data on the EGS current situation and trends in Sarvelat and Javaherdasht study area. This approach, has been applied in previous studies which published by different authors. But considering the specific characteristics of our study area we tried to outline a practical approach which has been indicated by figure 3 with an emphasize on priority ES identification, situation and trend, relevant capacity and spatial mapping.

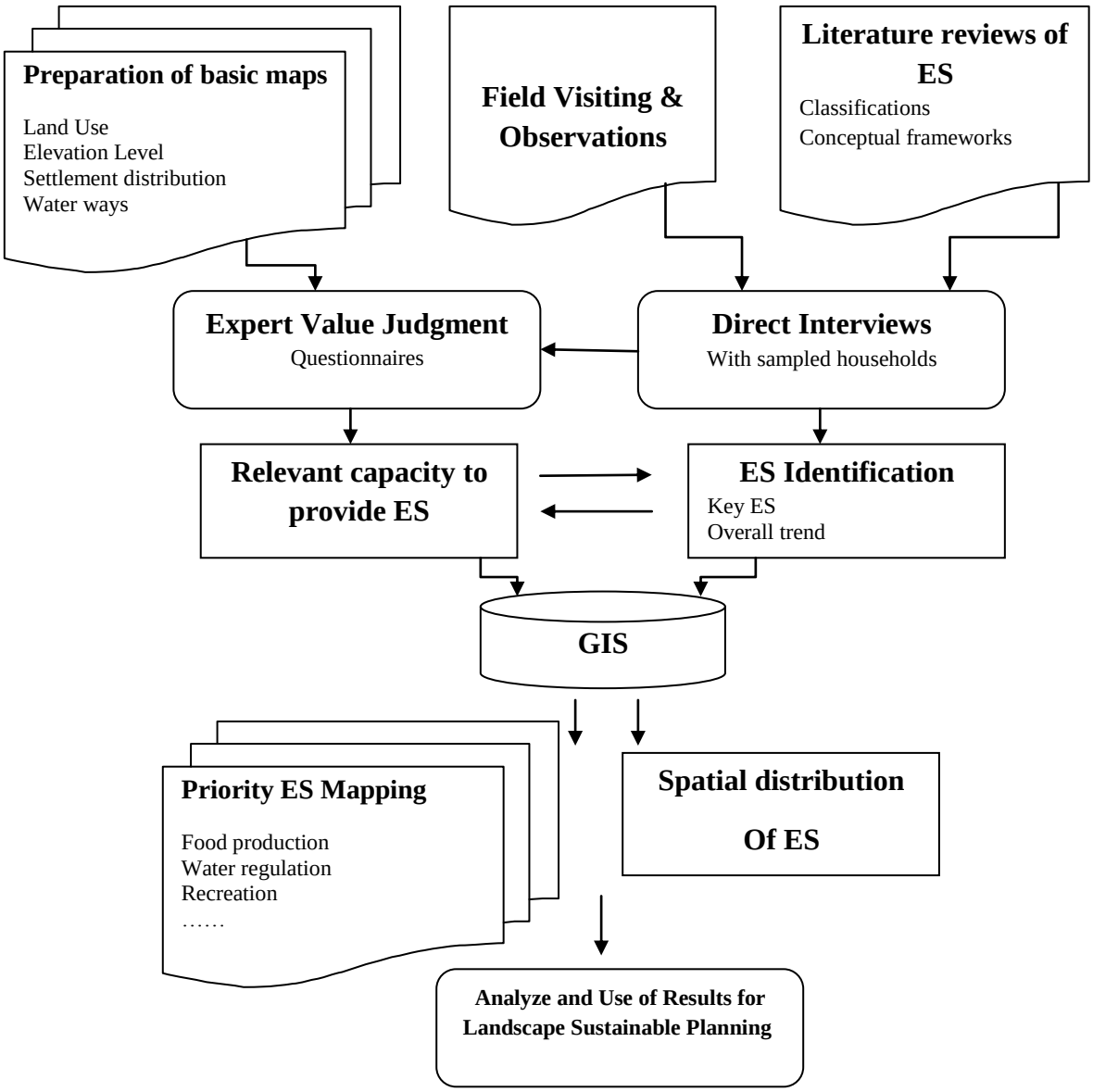


Figure 3. Practical approach of qualitative assessment in study area

3. Study results

- A wide range of ES were identified that are provided by the forest landscape in the study area but eight priority (Key) ES were selected as below:

1-Water supply 2-Food production 3-Recreation 4-Erosion control and sediment retention 5-Water regulation 6-Habitat/refuge 7-Climate and air quality regulation 8-Raw materials

- The gathered data related to these eight top priority ES was transferred to Arc GIS software and 8 ES maps were produced which shows spatial distribution of ES provision across the concerned landscape based on expert judgment.
- The general status of ES and their changes over time were identified based on local households opinions. On this basis, it was specified, while some sub categories of provisioning services such as food production, including Rice, fruit and recreation as a cultural services have highly been increased, the other services in particular timber production, water purification and supply and biodiversity have been dramatically lost.

4. Conclusion

Although, this study presents only a general qualitative results in related to ES spatial supply and their trend in Sarvelat & Javaherdeh, but as this is the first investigation based on ES approach, in the area where unavailable data is a major challenge, these results can be fundamentally used for the future steps in order to more precise measurements and quantifications. Combination local statistics in addition to further spatially data with higher resolution from different temporal periods, could lead to more detailed results. But as these were not available at this time, such shortcoming should be complemented in next complementary assessment procedure, using proxies and modeling tools.

Acknowledgement

This mentoring scheme was tank fully funded by UNEP/WCMC, but it couldn't be possible without CIFOR coordination. Hereby, both institutes are greatly appreciated for their assistances. Also, as a trainee, I offer my greatest thanks and gratitude to Dr. Himlal Baral and Dr. Matthew Lings who offered so much valuable guidance during my work.

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