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MINISTRY OF ENVIRONMENT, GREEN DEVELOPMENT AND TOURISM

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VALUATION OF CONTRIBUTION OF ECOSYSTEM SERVICES OF THE IKH NART NATURAL RESERVE TO SECTORAL ECONOMIC DEVELOPMENT

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August 2015

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VALUATION OF CONTRIBUTION OF ECOSYSTEM SERVICES OF THE IKH NART NATURAL RESERVE TO SECTORAL ECONOMIC DEVELOPMENT

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CONTENT

ACRONYMS

BAU	Business As Usual
ESS	Ecosystems services
INC	Investing in Natural Capital
INNR	Ikh Nart Nature Reserve
MEGD	Ministry of Environment and Green Development
MoFA	Ministry of Food Agriculture
MNPAS	Mongolian Network of Protected Areas
NBT	Nature-based tourism
NJC	Nomadic Journey Company
NGO	Non Government Organisation
NSO	National Statistics Office Mongolia
PAAD	Protected Areas Administration Department
TSA	Targeted Scenario Analysis approach
SEM	Sustainable Ecosystems Management
SPAN	Strengthening of the Protected Area Network
UNDP	United Nations Development Program

EXECUTIVE SUMMARY

The United Nations Development Programme (UNDP) sponsored GEF Project "Strengthening of the Protected Areas Network of Mongolia (SPAN)" (2010-2015) is providing support to the Ministry of Environment, Green Development and Tourism. The objective of the project is to catalyze the management effectiveness and financial sustainability of Mongolia's protected areas system. The project has three major outcomes that will contribute to achieve its objective: (1) Strengthened national policy, legal and institutional frameworks for sustainable management and financing of the national PA system; (2) Institutional and staff capacity and arrangements are in place to effectively manage and govern the national PA system; and (3) Sustainable financing mechanisms and innovative collaboration approaches demonstrated at demonstration sites, increasing funds and effective strategies for PA management.

In order to achieve the overall project objective, and particularly to mobilize political will to expand financial support to the Mongolian Network of Protected Areas (MNPAS), an economic valuation of the contribution of the MNPAs to the economy has been deemed necessary. This valuation includes a site level report on the Ikh Nart Nature Reserve (INNR). This report is an integrated part of the above-indicated UNDP's SPAN Project, and focuses on the INNR.

Its objective is to analyze selected productive sector and determine the gains or losses of undertaking productive activities by comparing "poor" with "sound" protected area's ecosystem management practices. It is expected that this report will assist government officials and the private sector to incorporate ecosystems' management policy into PA investment, economic planning, corporate business plans, and investment policies at sectoral level. It is also expected that the input of this report will provide economic and social arguments to help MEGD to mobilize political will to increase financial support the MNPAs' management plans and financial strategies.

Section 1 provides an overview of the INNR and its current financial situation. Currently, there is no state funding allocated to the INNR because it is not under the management of the Protected Areas Administration Department (PAAD). The Government of Dornogobi aimag provides basic funding to Airag and Dalanjargalan soums for the protection of INNR.

In Section 2, a brief conceptual framework ecosystems and ecosystems services; and a description of INNR ecosystems.

Section 3 is the core part of this report. It addresses the main economic benefit of INNR's ecosystems to the local economy and includes grassland, nature-based tourism and drinkable water.

The INNR provides natural grasslands to sustain livestock productivity for the thousands of herders of the Bichigt bag of the Dalanjargalan soum, Nart bag of the Airag soum and neighbouring soums. During the natural disasters including dry summers or harsh winters, grassland for the argali sheep and other wild animals are threatened because of livestock overgrazing. Currently, neither the soum nor the aimag Government have control or regulation on the sustainable grassland management within the reserve. This is a typical BAU scenario with as high impact on the ecosystem. Despite BAU practices, grassland ecosystems make a significant contribution to the economy.

The estimated total annual market value of the ecosystem services of the INNR is 25.5 billion tugrigs per year including 14.6 billion tugrigs for the livestock sector (including hay production), 10 billion tugrigs for tourism and 0.88 billion tugrigs for the drinking water sector. Evidently, grassland resources at the INNR make a significant contribution to alleviate poverty in the region. Livestock is central to support rural livelihoods. The economic benefits from livestock breeding, e.g. sheep and cow breeding, do not come without ecological damage, as is the case of erosion and overgrazing in the concentration areas of INNR. However, further research is needed to determine an accurate level of degradations and its costs to the economy.

Nature-based tourism (NBT) has potential in the INNR because it is rich in natural attractions and wildlife. NBT is still at a very early stage in the INNR; therefore, it is not a major component of the local economy in present. However, nature conservation (the basis for developing NBT), could possibly generate 10.0 billion tugrigs in the INNR region. This is significant benefit to the local economy. Unfortunately little or nothing is invested in development nature-based tourism in the INNR region.

A shift to INC is needed to improve, for example, access roads and means of transport, diversification of services, and improvement of tourism-based revenue sharing mechanisms. However, NBT in Mongolia is still at an early stage of development and will require a great deal of investment and diversification.

Water is essential to enable economic growth in and around INNR. The annual water cycle from rainfall to runoff is a complex system where several processes (infiltration, surface runoff, recharge, seepage, re-infiltration, moisture recycling) are interconnected and interdependent. In INNR, the main drinking water sources are small springs and underground water wells. Water springs depend on precipitation level of the year. In recent years, many small springs have been dried out due to climate change, lower rainfall and overuse.

Water value for human consumption within the Ikh Nart reserve is 11.3 million tugrigs per year approximately. However, due to the limited number of people living in and around the INNR, the market value (MV) of the water is minimal. The economic value of Khalzan Uul spa treatment is 108 million tugrigs. Nevertheless, when looking at livestock water consumption, the value of water to the livestock sector is significant, and therefore highly important to local economic growth. Herders use 144 thousand m^3 of water for their livestock in a year. In monetary terms, considering a conservative value of USD 2 per m^3 of water, the annual market value is 763 million tugrigs or and an annual saving of 6750 tugrigs per households living in the INNR surrounding areas, Daranjargalan and Airag soums.

Despite the challenges of having limited information available to the study, the existing evidence found on the economic value of the ecosystems services (ESS) provided by the ecosystems of the INNR make a significant contribution to the regional economy.

Nevertheless, as in many other countries in the region, resource degradation under BAU, typically, offers immediate returns in the form of marketable products such as livestock; and the negative impact of ecosystem wear and tear under BAU practices may not be visible in the short term but will eventually damage economic growth. Conclusions and recommendations are provided in Section 4.

1 INTRODUCTION

The Ikh Nart Nature Reserve (INNR) was established in 1996 and it covers total of 66,758 hectares of semi dessert and rocky landscaped grassland areas. It is located at N 45.72301 E 108.64488. The climate is semi-arid and average temperature is -1.9 degrees centigrade.

The INNR shelters a range of ecosystems that are home of the Argali sheep (Ovis ammon), Siberian ibex (Capra sibirica), Mongolian Gazelle (Procapra gutturosa), small mammals and birds including Falco cherrug, Golden eagle (Aquila chrysaetos) and hundreds of other types of bird. Ikh Nart is also rich in historical cultural heritages which includes monuments and rock art. The INNR's ecosystems, such as grasslands, fresh water, and natural tractions, are indispensable to sustain development in the region.

The INNR was initially managed by the Dornogobi aimag Government and a board of management, with eleven (11) members, established in 2011. In May 2013, the Ministry of Environment Green Development (MEGD), the Government of Dornogobi aimag and the NGO "Argali research centre" signed a new management agreement. Since then, the Argali research centre NGO has played the role of protected area administrator and worked towards the implementation of the management plan for the INNR for 2012-2017.

There is no state funding allocated to the INNR bcause it is not under the management of the Protected Areas Administration Department (PAAD). The Government of Dornogobi aimag Government provides funding to Airag and Dalanjargalan soums for the protection of INNR. In 2013, the Dornogobi aimag Government allocated Mongolian Tugrug (MNT) 126 million (approx. US$93,000) for the new office building and information centre in Dalanjargalan soum and for the operational cost of the administration centre for the second half of the year.

The management plan of INNR for the 2012-2017 was jointly approved by Dornogobi aimag Resident Representative Khural and MEGD in August 2012. The Dornogobi aimag government will provide funding until 2017 based on the approved management plan. The Dornogobi aimag has been the best role model within the local governments of Mongolia in terms of the protected area financing.

The Aimag government funds only cover the operation cost of the park administration; no investments; this result in an increasing financing gap for the long-term sustainability of INNR.

The main objective of this study is to analyse selected productive sector and determine the gains or losses of undertaking productive activities by comparing "poor" with "sound" protected area's ecosystem management practices; i.e., BAU and INC approaches[1]. Based on this assessment, it is expected that this report will inform policy makers and businesses in Dornogobi aimag about the economic risks and opportunities of undertaking productive activities that impact on the ecosystem services of the INNR. It is expected that this report will assist government officials and the private sector to incorporate ecosystems' management policy into PA investment, economic planning, corporate business plans, and investment policies at sectoral level.

[1] Business as Usual (BAU) - continuing under-investment in PAs: This corresponds to a situation where current trends in PA investment, management and use continue. As a result, although the area of the PAs expands as planned, existing and new PAs suffer from a chronic lack of funding, and weak management effectiveness. There may be progressive encroachment into PAs. The recreational use of PAs increases, as national tourism develops, at least initially, but over the longer-term stagnates as the quality of PAs and visitor experiences decline. Insufficient spending also translates into an inability to manage threats to biodiversity and ecosystems: while PAs continue to provide important ecosystem services (such as water supplies, watershed protection and flood control), the quality and impact of these services decreases progressively over time. Investing in Natural Capital (INC) - adequate investment in PA conservation and sustainable use: This corresponds to a situation where PA investment rises, policy implementation is improved, and management effectiveness increases. The recreational use of PAs continues to increase steadily, in line with development of the national tourism market, and visitor experience improves as the quality of both natural ecosystems and the facilities and services offered by PAs advances. Better management effectiveness means that the status and integrity of biodiversity and ecosystems in PAs and their broader landscapes is maintained and improved: the quality and impact of PA ecosystem services is sustained and in many cases grows.

2 INNR'S ECOSYSTEM AND ECOSYSTEM SERVICES

An ecosystem is a natural unit consisting of all plants, animals and micro-organisms (biotic factors) in an area functioning together with all of the non-living physical (abiotic) factors of the environment; it is a completely independent unit of interdependent organisms, which share the same habitat. Protected areas provide the best continuous natural habitats for ecosystems to be able to function and continue to deliver these services. The existing ecosystems in INNR are included in Table 1.

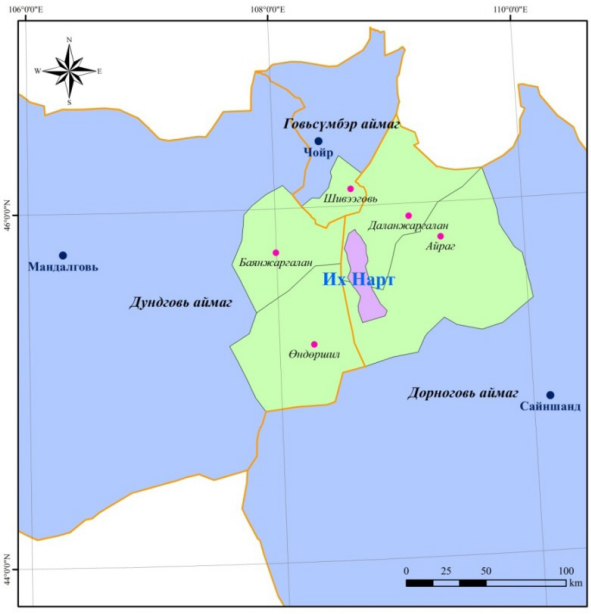
Table 1: Ecosystem Services of the INNR

Ecosystem service in INNR	Covered in the study
Freshwater (watershed services)	●
Grasslands (hay)	●
Nutrient cycling	●
Carbon sequestration	●
Human health (drinkable water)	●
Cultural	●
Nature-based sports: fishing, hunting, skiing, hiking, nature & wildlife viewing	●

The INNR is only three hours drive from Ulaanbaatar City. It is located on the border of Dalanjargalan and Airag soums of the Dornogobi aimag (Map 1).

A total of 37,587.7 hectare belongs to Dalanjargalan soum and 29,140 hectare of the INNR belongs to the Airag soum of the Dornogobi aimag.

Map 1. Location of Ikh Nart NR



The INNR is rich with endangered, vulnerable and near threatened animals, birds and plants. More than 30 species of wild animals, 156 species of birds and more than two hundred species of plants mainly shrubs and grasses can be found within the reserve. The number of Argali sheep has more than doubled from 400 to 1000 in the last ten years.

The list below includes some examples of these animals, birds and plants. .

ANIMALS

- Argali sheep (Ovis ammon) -endangered
- Siberian ibex (Capra sibirica) —near threatened
- Mongolian gazelle (Procapra gutturosa)-Asiatic Wild Ass (Equus hemionus)-endangered
- Corsac Fox (Vulpes corsac)-near threatened
- Red Fox (Vulpes vulpes)-near threatened
- Grey Wolf (Canus lupus)-near threatened
- Pallas's Cat (Otocolobus manul)- near threatened and
- Other more than 30 types of mammals

BIRDS

- Eurasian Black Vulture (Aegypius monachus)-near threatened
- Greater spotted Eagle (Aquila clanga)-vulnerable
- Lesser Kestrel (Falco naumanni)-vulnerable
- Saker Falcon (Falco cherrug)-endangered
- Great Bustard (Otis tarda) -vulnerable
- Houbara Bustard (Chlamydotis undulate)-vulnerable and
- Almost 150 other types of birds

PLANTS

Vegetation is sparse, with shrubs, scrub vegetation, and turf grasses dominating. Different plant communities can be found around oasis and streams, on rocky outcrops, and in other areas.

- Lilium pumilum
- Heteropappus hispidus
- Serratula centauroides
- Atraphaxis frutestens
- Anabasis brevifolia and others

CULTURAL MONUMENT AND ARTS

The INNR has significant archaeological and cultural artefacts, such as burial cairns, steles, and other commemorative monuments and markers; the remains of campsites and rudimentary structures; rock art; and other indications of the cultural history and vitality of ancient Mongolia. The scientists from Earthwatch, Colorado US have logged sites ranging from the New Stone Age (Neolithic) period about 6,000 years ago, an era marked by the domestication of herd animals, to sites from the Tibetan Buddhist period, from around the 13th century AD to 1937. Chronologically in between these are Bronze Age, Iron Age, Turkic, and Mongolian Empire sites[2].

The contribution of the above mentioned ecosystems is discussed in the next section.

Archaeological and cultural in INNR

[2]http://au.earthwatch.org/expeditions/archaeology-of-the-mongolian-steppe#importance.

3 THE ECONOMIC CONTRIBUTION OF ECOSYSTEM SERVICES OF THE INNR TO THE LOCAL ECONOMY

The main economic benefit of INNR's ecosystems is the protected grassland because of the economies of Dalanjargalan and Airag soums heavily rely on traditional livestock husbandry. Nomadic herders have a free access to the grassland of INNR. This is therefore a free ecosystem service.

3.1 METHODOLOGY

The study used a basic Targeted Scenario Analysis (TSA) approach. Using economic impact indicators, the TSA assesses current "business as usual (BAU)" ecosystems management practices and its current value; and compares it with INC (investing in natural capital) practices and the potential values under INC. TSA may also assesses potential gains (or losses) of shifting from BAU to INC. The BAU approach is characterized by a focus on short-term gains (e.g., < 10 years), externalization of impacts and their costs, and little or no recognition of the economic value of ESS, which are typically depleted or degraded. Under SEM, the focus is on long-term gains (> 10 years); also under INC, the costs of impacts are internalized. In INC, ESS are maintained, thus generating potential for a long-term flow of ecosystem goods and services that can enter into decision making.
INC practices tend to support ecosystem sustainability as a practical and cost-effective way to realize long-run profits.

It is expected that the TSA approach will serve multiple purposes:

- Analyze the selected sectors and determine the potential economic gains or losses of undertaking productive activities by comparing "poor" with "sound" environmental management practices.
- Inform policy makers and businesses about the economic risks and opportunities of undertaking productive activities that impact ecosystem services.
- Assist government and the private sector to incorporate ecosystems' management policy into economic planning, corporate business plans, and investment policies at sectoral level.
- Provide economic (and social) arguments to mobilize political will to increase financial support to improve ecosystems management.

Depending on the availability of data, economic indicators are used to assess BAU and INC impact. For example, level of productivity and its value, employment and income, fiscal impacts (taxes to government), and foreign exchange earnings. A more detailed description of the methodology is provided in Annex 1.

Using the TSA approach, the following sectors were assessed: livestock, nature-based tourism and drinking water supply.

3.2 LIVESTOCK SECTOR

The INNR provides natural grasslands to sustain livestock productivity for the thousands of herders of the Bichigt bag of the Dalanjargalan soum, Nart bag of the Airag soum and neighbouring soums.

During the natural disasters including dry summers or harsh winters, grassland for the argali sheep and other wild animals are threatened because of livestock overgrazing. Currently, neither the soum nor the aimag Government have control or regulation on the sustainable grassland management within the reserve. This is a typical BAU scenario with as high impact on the ecosystem.

Table 2 includes the characteristics of the livestock management practices in INNR in the two scenarios of BAU and INC.

Table 2.

Characteristics of livestock management practices in INNR: BAU and potential INC scenarios

BAU	INC
• Concentrated overgrazing, lack of sustainable grassland management results negative impacts on wildlife and biomass; • Traditional nomadic grazing management frequently brings severe degradation to the water resources; • In both of national and provincial levels, lack an overall system of monitoring and reporting grassland conditions; • Limited research development in grassland carrying capacity to gather reliable information to manage the grasslands in INNR; and • The style of traditional animal husbandry often leads to seasonal overgrazing, and there is a lack of incentives for adopting grazing strategies, which promote multiple-use benefits.	• Sustainable grassland resource management for the wildlife and livestock; • Provide extension services to improve nomadic husbandry practices and decrease degradation of the water sources; • Establish, at national and provincial levels, an effective system of monitoring and reporting grassland conditions; • Provide adequate funding for the research development in grass land management in protected areas; and • Better enforcement and control of grazing policies and new grazing strategy avoids seasonal overgrazing, and there are financial incentives for adopting grazing strategies, which promote multiple-use benefits.

According to the INNR Management Plan (Annex II-15 and II-16), in 2010-2011, there were approximately 152 thousand livestock heads in Airag and Dalanjargalan soums including 55 thousand of livestock heads in Nart and Bichigt bags. As shown in Table 3 below.

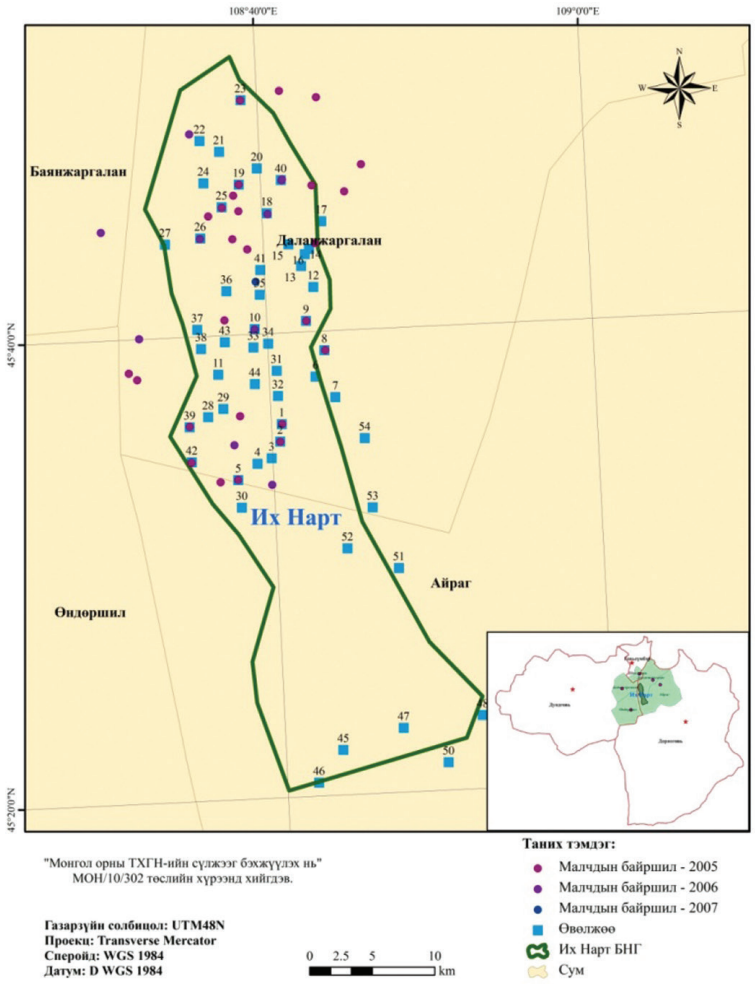
In 2008-2010, 5,000 to 20,000 livestock came into the INNR for the better grassland from the Dundgobi and Gobisumber aimags. The numbers increase if there is a dry summer or harsh winter in the neighbouring soums or bags.

Table 3. Total number of livestock in soums and bags (INNR)

	Airag soum		Nart bag	Dalanjargalan soum		Bichigt bag	Total 2010	Нийт
Year	2010	2011	2011	2010	2011	2010	2010	2011
Sheep	31320	33292	14894	41563	40775	11467	72883	74067
Cow	2083	2226	855	2398	2474	746	4481	4700
Horse	5413	5330	2021	4657	4353	1545	10070	9683
Camel	862	823	194	493	511	163	1355	1334
Total	67858	68008	28802	82179	82383	26137	152047	152402

Herders are located in the north and centre of the INNR mainly and those locations are very close to the wild life. Map 2.

Map 2. Location of the herders within the reserve in 2005-2007



The estimated total market value (MV)[3] of livestock production within the Dalanjargalan and Airag soums is 15.8 billion tugrigs (US$8.8 million). This value was estimated from producing meat, milk, cashmere, wool, and hides are taken as outputs from livestock sector. The estimated economic benefit of the INNR to livestock production of herders of the Airag and Dalanjargalan soums are 7.8 and 7.96 billion tugrigs respectively. Based on this estimation, the livestock production in INNR (Bichigt and Nart bags) is 36% of the total which equals to 5.68 billion tugrigs in 2012. Table 4 and Graphic 1 illustrate these values.

Table 4. Total market value of the livestock production in INNR area (billion MNT)

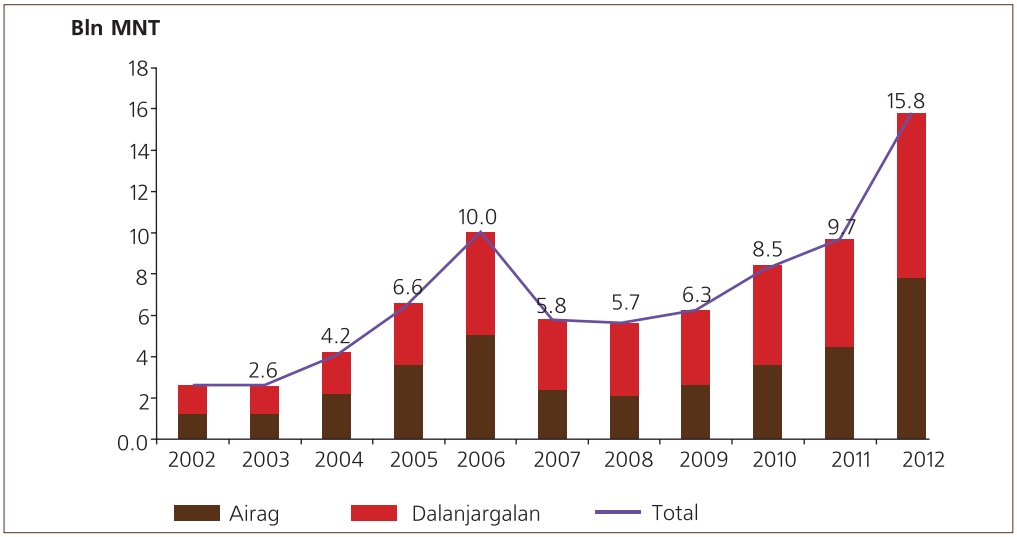
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Airag	1.28	1.29	2.19	3.67	5.07	2.40	2.11	2.65	3.62	4.49	7.84
Dalan Jargalan	1.34	1.31	2.02	2.94	4.96	3.40	3.60	3.61	4.88	5.19	7.96
Total	2.6	2.6	4.2	6.6	10.0	5.8	5.7	6.3	8.5	9.7	15.8
INNR	0.94	0.94	1.5	2.31	3.6	2.0	2.0	2.2	3.1	3.5	5.8

Source: *Authors estimation, National Statistcs Office (2014)*

[3] Market value refers to the highest estimated price that a buyer would pay and a seller would accept for an item in an open and competitive market. In accounting, it refers to the replacement cost of an item arrived at by deducting estimated carrying, delivery, and selling costs from its estimated selling price. http://www.businessdictionary.com/definition/market-value.html#ixzz3L4UK72iw

Between the 2008 and 2012 the total livestock production is increasing, constantly, meat and milk shares the most among other livestock products. Increasing total economic value is due to increasing livestock product prices and government subsidy policies. (Graphic 1).

Graphic 1. Estimated total market value of livestock production



Source: *Authors, based on Official data (2014).*

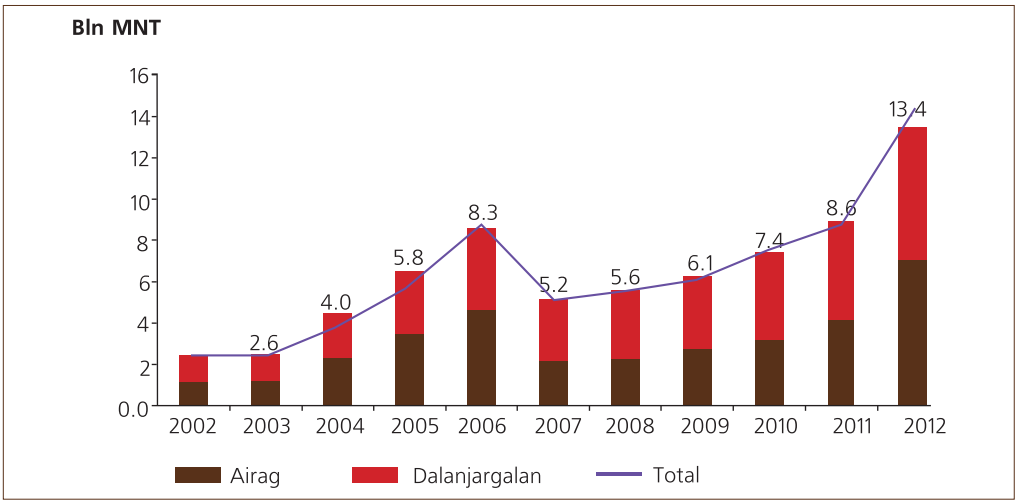
Livestock management practise in INNR has been dependant on traditional nomadic livestock managment for many years. Herders are from Bichigt and Nart bag heavily rely on the grassland of the reserve all around the year. Also herders from neighbouring bags and soums can be easily move in to the reserve any time if they need to.

Table 5. Estimated value of grassland ESS in and around INNR (Billion MNT)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Airag	1.3	1.3	2.1	3.1	4.2	2.1	2.2	2.6	3.2	3.9	6.8
Dalanjargalan	1.3	1.3	1.9	2.7	4.1	3.1	3.4	3.5	4.2	4.7	6.5
Total	2.6	2.6	4.0	5.8	8.3	5.2	5.6	6.1	7.4	8.6	13.4

Source: *Authors, based on Official data (2014).*

Graphic 2. Total market value of Ecosystem Services of INNR for Livestock Sector (Bln MNT)



Source: *Authors, based on Official data (2012-2013)*

Currently, the lack of sustainable management for the grassland within the reserve brings overgrazing and degradation and it results in insufficient grassland and water sources for wildlife. Therefore, wild animals including argali sheep are forced to leave the protected area occasionally. If they could be seen outside of the protected area, they are easy targets for illegal hunting and other dangers. This is typical BAU scenario.

In recent years the quality of pastureland in Mongolia has suffered significant degradation due to increased number of livestock and effects of climate change. Scientists have discovered that the pastureland carrying capacity has decreased from 70 million sheep forage unit (SFU) to 50 million SFU in last 20 years. Regrettably, Mongolian steppe is limited by around 111 million hectare of pastureland and maximuim sustainable yield is 50,6 million SFU per year (Dorligsuren 2006).

The carrying capacity of grassland in INNR should be 2-4 sheep head per hectare as a location of INNR is in steppe and gobi desert steppe. According to INNR management plan there always were overgrazing in winter 2009-2011 within the reserve. Table 6 shows that the overgrazing, summer winter yield, carrying capacity of the grassland in INNR. The total grassland size is 28678 ha but the carrying capacity of grassland area was different in each year because it was depending on yield of the summer and winter of the year. Overgrazing was highest in 2010 due to dry and hot summer results insufficient winter yield.

The unregulated utilisation of public grassland for private livestock production has resulted in the depletion of ecosystem services. Overgrazing has a high environmental cost and is not sustainable, since it is not possible to simply continue to increase the number of livestock in order to sustain productivity. This is typical BAU scenario.

Table 6. Overgrazing of the Grassland in INNR between 2009-2011

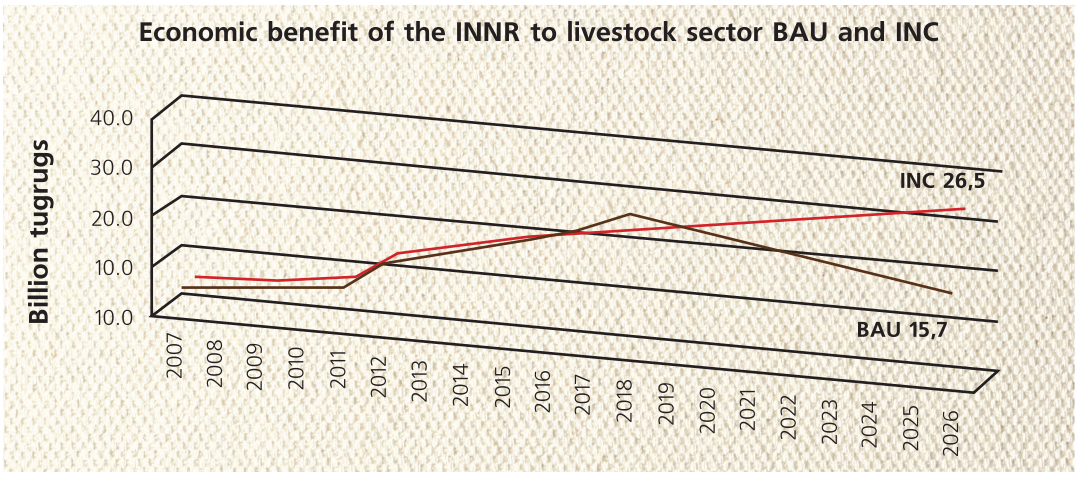
Bag names	**Year**	**Summer yield**	**Total livestock during winter**	**Winter yield**	**Grassland size**	**Carrying Capacity CC during winter**	**Overgrazing** (difference between the CC and total number of livestock)
		C/ha	Sheep head	ц/га	Га	Хонин Толгой	хонин толгой
Nart	2009		C/ha	hectare	Sheep		
Bichigt		head	Sheep				
Nart	2010	head	45750	0.24	14750	14160	-31590
Bichigt		0.3	39411	0.18	13929	10029	-29382
Nart	2011	1.2	44895	0.72	14750	42480	-2415
Bichigt		0.8	38567	0.48	13929	26744	-11823

Source: *Appendix II-36, INNR Management Plan 2012-2016, Authors estimation*

The study team did not find adequate national or sum level information regarding annual production of, for example, sheep meat. However, applying a conservative percentage of increase 5%, based on historical data (13.3% per year between 2002 and 2012), the total benefit of INNR to the livestock sector will be 26.5 billion by 2026 with the INC scenario.

On the other hand, the assumption was 3% decrease in the growth of benefit to illustrate the potential economic loss as a result of continuing with BAU practices and total benefit will be 15.7 billion tugrigs by 2026 (Graph 3).

Graphic 3. Economic benefit forecast by BAU and INC scenario (billion tugrigs)



Source: *INNR Management Plan 2012-2016, Authors estimation*

The value of grasslands in the INNR could also be estimated in terms of the value of the tonnage of grass produced within the INNR; this is shown in Table 7 below.

Table 7. Tones of hay produced in INNR (2011)

	Grassland Size Hectare	Hay production ha/kg	Hay production Tonne	Total value of hay billion tugrig
Nart	14750	3,687,500	3,687.50	738
Bichigt	13929	3,482,250	3,482.25	696
Total	28679	7,169,750	7,169.75	1,434

Source: *INNR Management Plan 2014.*

Based on Table 7, considering a conservative market value, in 2011, of 200 MNT per kg of hay[4] (200.000 MNT per ton) the estimated value of the ecosystem service in 2011 was 1.4 billion MNT. To estimate the current value, the average inflation rate of 12.5% from 2007-2014[5] was applied. Thus, it is estimated that the current value is 2 billion MNT. This is significant contribution of INNR to the local economy.

An important shift to INC, was the government strategy to shift from a focus on animal numbers to animal productivity, the GOM has formulated the new National Mongolian Livestock (Mongol Mal) Program (NMLP) for 2010 to 2021[6]. The first phase, "Action Plan for 2010-2015" is to be financed with national and international funding. Currently, the NMLP is receiving 3% of the national budget.

3.3 NATURE-BASED TOURISM (NBT)

NBT has potential in the INNR because it is rich in natural attractions and wildlife. Approximately, 1000 argali sheep (Ovis ammon), the largest population of wild mountain sheep in the world, 200 Siberian ibex (Capra sibirica) and Mongolian gazelle (Procapra gutturosa) live within the INNR. The reserve also has a sizeable population of the world's biggest vulture, the black or cinereous vulture (Aegypius monacha), as well as more than 150 other types of birds. The INNR also is extremely rich in historical cultural heritages including monuments and rock art.

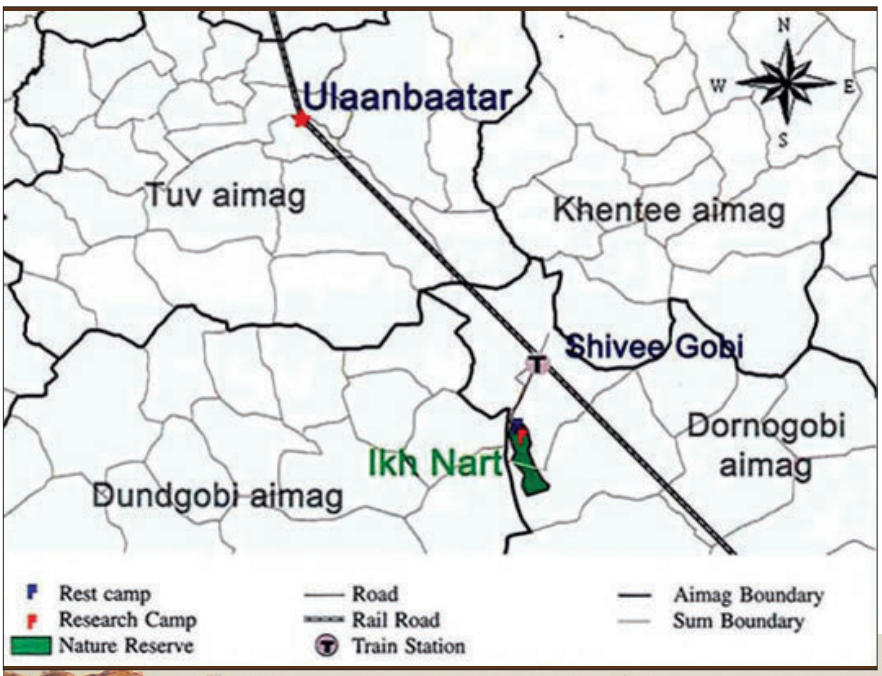
Travelling to and from INNR is reasonably easy, and has become even easier in recent years. The most common ways to access INNR are by car and train (Map 3). However, the INNR is approximately 300 Km from Ulaanbaatar.

[4] According to the calculation of Muur's pug herders the cost of a bale of hay locally was 2,500 MNT. So, the price of 1 kg hay is 100 MNT. Chantsallkham Jamsranjav (2009), Sustainable Rangeland Management in Mongolia: the role of herder community institutions, Mongolian Society for Range Management.

[5] The inflation rate in Mongolia was recorded at 11 percent in December of 2014. Inflation Rate in Mongolia averaged 12.54 percent from 2007 until 2014, reaching an all time high of 31.90 percent in July of 2008 and a record low of -1.90 percent in September of 2009; the inflation rate in Mongolia is reported by the Mongol Bank. http://www.tradingeconomics.com/mongolia/inflation-cpi

[6] Rasmussen, D. et al, Improving Feed and Fodder Supply for Dzud Management, World Bank (2011)

Map 3. Access ways to INNR



By car: The newly paved road that runs southeast from Ulaanbaatar paralleling the railway line from Ulaanbaatar to Beijing. Although the pavement ends at Choir, continue following the road south to the town of Shivee-Gobi (about 30 km from Choir). Drive time to Shivee Gobi from Ulaanbaatar is approximately 3-4 hours. From Shivee-Gobi, drive southwest approximately 50 km to reach the northern edge of INNR.

By train: The local Ulaanbaatar to Sainshand train to Shivee Gobi (stop #22). The train provides a comfortable service but is slower than driving. The train journey takes about seven hours to Shivee Gobi. There is no bus service from Shivee Gobi to INNR, so tourists need to take a taxi for the last leg of the journey. The return train to Ulaanbaatar stops at Shivee Gobi station at 1:00AM and sleeping cabins (coupes) are available.

Currently, only one company, Red Rock Ger Camp (RRGC), is working in tourism sector and economic benefit of tourism sector from the INNR is relatively small. The Nomadic Journey Company of Sweden established the RRGC in 2008 within the INNR. GRGC has a maximum capacity to accommodate 30 tourists at one time. In 2011, there were 162 tourists who visited to RRGC. The rate of bed usage was as low as 0.15 percent.

The INNR offers similar tourism options as other major national parks in Mongolia. Therefore, it faces serious competition. Camel riding, bird and wild life watching and bush walking are the main services of this tourist camp. The price at RRGC is USD 400-500 per person for 3-4 days visit. The total gross annual income of the RRGC varies from USD 60,000 to USD 80,000.


RRGC and tourists hiking in INNR.

The Mongolian branch of Nomadic Journey Company (NJC) is located in Ulaanbaatar City. According to the NJC website, the company supports the pastoralist's livelihood and has developed partnerships with many nomads across Mongolia. NJC rents their animals for treks and rides and buys meats and milk products from locals. NJC offer seasonal jobs to both rural Mongolians and young people from the city[7].

However, the study team was not able to access data to assess the economic and social impact of NJC in the INNR and its vicinity in more quantitative terms. Nevertheless, the current operations run by NJC showcase the potential of INNR.

Local people of nearby small towns of Airag and Dalanjargalan mainly visit the INNR. The latter, for example, has only 827 households (2,581 people), including 854 children aged 0-15 (2010). The total population of Dalanjargalan and Airag soums includes a total of 1,942 households, with an estimated 6,179 people out of which 1.658 are children ages 0-15 years old (INNR Management Plan, 2014). Information on NBT related income to the household is not available, however, it is estimated to be minimal.

Although NBT is still at a very early stage in the INNR and it is estimated that is not a major component. The composition of natural resources use based income in the Dalanjargalan and Airag soums is provided in Table 8 below. Between 2008 and 2011, the total income from the natural resources use fee had been increased and has reached 223.7 million MNT (USD124.27 million)by the first half of the 2011. This is significant benefit to the local economy and 20% of this income supposed to be contributed to the INNR. Unfortunately little or nothing is invested in development nature-based tourism in the INNR region.

Table 8. Income from natural resources use (MNT millions, 2008-2011).

2009–2011, million tugrigs								
Type of income	Dalanjargalan				Airag soum			
	2008	2009	2010	2011 /first half/	2008	2009	2010	2011 /first half/
Income from mining extraction fee	43.1	35.1	36.1	9.3	10	40	120	160
Land use fee	7.3	14.6	17.8	31	4.4	4.4	4.5	9.6
Water use fee	0.7	1.4	5.1	6.5	1.2	1.2	6.5	7.3
Hunting fee					0.27	0.27	0.27	
Total income from fees	51.1	51.1	59	46.8	15.9	45.9	131.3	176.9
Environment protection cost /20% by law/	10.22	10.2	11.8	9.4	3.2	9.2	26.3	35.4

Source: *Appendix II-12 INNR Management Plan, 2012*

[7] http://www.nomadicjourneys.com/low-impact/

A shift to INC will lead to improvements in, for example, access roads and means of transport, diversification of services, and improvement of tourism-based revenue sharing mechanisms. However, nature base tourism in Mongolia is still at an early stage of development and will require a great deal of investment and diversification.

Table 9 shows Characteristics of Natural Based tourism in INNR for two scenarios (BAU-business as usual and INC-investing in natural capital). Based on actual level of tourism development and supportive policies in INNR, NBT is considered under BAU. However, in this case, BAU does not imply that the current tourism operations, such as the one run by NJC in the area are damaging to the INNR's ecosystems.

Table 9.

Characteristics of Natural Based Tourism of Ikh Nart NR (BAU/INC)

BAU	INC
• Limited visitation due to inefficient tourism policy and lack of regional economic development policy; • Limited domestic bus routes to the INNR, poor road infrastructure and low quality transport service; • Limited services for short stay and overnight stay visitors including picnic area, car parking, electricity, water availability, shower and toilets; • Lack of visitor information centres and information material; and limited web-based information; • Limited access to health services (hospitals) and no training or information on health and first aid for tourists; • Lack of entry fee system and inefficient pricing of entry tickets;	• An increase in number of visitation through the sustainable tourism and economic development policy; • New bus routes from train station to the main attraction of INNR and improved transport quality service; • New picnic areas and toilets for day time visitors and camping areas with electricity, water supply, shower and toilet for overnight visitors; • Visitor information centres in appropriate locations and information material in English and other major languages; • Improved access to health services (hospitals) and training or materials about health and first aid in wild life; • Improved entry passes systems and fees including diversified options such as seasonal, annual, weekend and family passes; and concession;
• Poor diversification of services (nothing unique all services are same as other tourism businesses) • Limited infrastructure and access to natural attractions and wild life including lack of marked trails and information signs; and • High unemployment in Airag and Dalanjargalan soums.	• Unique and diverse services would attract more visitors; • Improved infrastructure and access to the wild life including walking tracks and information signs, map, and directions; and • Job creation and small business development in parallel with NBT expansion.

An example of a nature reserve considered to be under the INC management situation is Tidbinbilla Australia (Box 1). The INNR is a suitable place for daytime visitors to enjoy outstanding wildlife. Therefore case study of Tidbinbilla Australia could be a good example for future development of INNR. Although INNR is not a major tourism destination in Mongolia; however, tourism to PAs in Mongolia is increasing; the pristine protected areas of Mongolia are key to the strengthening of NBT in the future.

Box 1. TIDBINBILLA NATURE RESERVE, AUSTRALIA

Tidbinbilla Nature Reserve (TNR) is located just 40 minutes drive from Canberra, offers outstanding wildlife and nature-based experiences in a natural setting, as well as opportunities to find out about the conservation initiatives at Tidbinbilla. At the Visitor Centre visitors can explore the interpretation gallery then have a coffee or light meal at the Tidbinbilla kiosk. In the Tidbinbilla shop people can buy unique souvenirs of Tidbinbilla's wildlife. In the reserve itself you can enjoy a picnic or barbecue with family and friends at one of the many picnic areas while the children enjoy the Nature Discovery Playground.

Ranger-guided activities are popular with visitors and can be booked online at www.tidbinbilla.act.gov.au. Experience wonderful wetland wildlife in the Sanctuary, find a koala in the eucalypt forest or watch for platypus at Black Flats Dam or in the Sanctuary. For the more energetic, there are the mountain bike trails around Jedbinbilla and Gibraltar Peak. If walking is more your style, then there are over 20 marked walking trails ranging from an easy short stroll to an all day bushwalk.

TNR offers programs that are managed by ACT Education & Training Directorate teachers and mapped against the Australian Curriculum and centre on three strands of enquiry and experience: a) environmental education, b) heritage education, and c) outdoor adventure (team-building and leadership).

A diversified entry fees system (policy) was re-introduced in 2009, and revenue is mainly used to enhance visitor services and directly contribute to your experience at Tidbinbilla. Visitor can purchase passes at Tidbinbilla Visitor Centre or online with Canberra Connect.

The main attractions of Mongolia are the traditional culture, which includes offering a unique pristine nature to tourists. Approximately, 50% of foreign tourists visit Protected Areas during their visit to Mongolia and this contributes 10-15% of total visitors of PA; and NBT, in the last ten years, has become more popular to Mongolians. For example, according to PAAD source (2013), 85-90% of total visitors to PAs were domestic tourists.

In 2013, the tourism industry directly employed 21,500 jobs (2% of total employment) and sustained, both directly and indirectly, 8% of GDP in Mongolia[8]. Leisure travel spending generated 500.6 billion MNT (USD 278 mln), 57.2 percent of this amount is spending of foreign visitors' and 42.8 percent is spending of domestic visitors (World Travel & Tourism Council, 2013).

As noted in the PAs network level report (UNDP, 2015), the long term growth forecasts are extremely positive with travel and tourism's contribution to the country's GDP set to rise by 6% per annum over the next ten years. With government support this figure could be boosted even further and the recent acceptance of the Open Letter by President Elbegdorj Tsakhia sends a strong signal of support to the Travel and Tourism industry, both within Mongolia and internationally. Although this is a positive signal, the lack of investment in sustainable tourism management could be a detrimental for NBT in the future.

An interesting move from BAU to INC, in 2008, was the partnership between the Ikh Nart Nature Reserve and Anza-Borrego Desert State Park of California. These PAs became official sister parks; an official agreement to foster relationships between both protected areas was signed.

Anza-Borrego Desert State Park is the largest state park in California. As part of the agreement, Anza-Borrego provided equipment and training to the staff of INNR. The agreement has also led to the development of a ranger program and improvement of border signs.

In the INC scenario, in order to have a visible impact in the local economy, it is estimated that at least 10,000 foreigners (Gobi Gurban Saikhan attracts 10,000 foreign tourists every year) could visit the INNR every year. The spending of one foreign tourist approximately USD 50 per day and if they stay for 5 days, the total income from foreign tourists is 2.5 million dollars. The income from entrance fee of the foreign tourists could reach 0.5 million and local economy could generate 3.0 million every year.

Also if 20,000 domestic visitors visit to INNR in a year, stay three days in average and spend 30,000 tugrigs per day for accommodation and meals. The total income to local economy from domestic tourists could reach 1.8 billion tugrigs and entrance fee could generate 0.1 billion tugrigs. If we convert dollar amount to tugrigs, the total income of tourism sector is 8.2 billion. There are also other small businesses including taxi service, entertainment and communication could generate 1.2 billion tugrigs in a year.

Based on above estimation the local economy could generate 10 billion tugrigs in a year from the tourism sector in INNR region by INC scenario.This initial goal will require significant public and private investments to improve infrastructure and most importantly, a range of services unique to the INNR that will enable tourists to wish to travel to INNR and spend money on site. This could trigger what is known as the multiplier effect of tourism[9].

3.4 DRINKABLE WATER SECTOR

Water is essential to enable economic growth in and around INNR. The annual water cycle from rainfall to runoff is a complex system where several processes (infiltration, surface runoff, recharge, seepage, re-infiltration, moisture recycling) are interconnected and interdependent (Savenije, 2002).

In INNR, the main drinkable water sources are small springs and underground water wells. Water springs depend on precipitation level of the year. If groundwater is extracted from an aquifer, further down in the cycle, less water will flow into a river. Map 3 shows the water sources within the INNR. In recent years, many small springs have been dried out due to climate change, lower rainfall and overuse.

There are rich aquifers in the INNR. However digging wells is expensive for the local herders. Therefore, local herders typically use springs water as a drinkable water. For instance, in 2002-2006 there were around 200 people living within the reserve. The number of

[8] Mongolian statistic book 2013 by National Statistics office Mongolia.

[9] Visitors to PAs and other natural attractions spend on travel and local transport, accommodation, food, and souvenirs in- and outside of the park. Thus, tourists generate substantial revenue within a variety of sectors. Like any sector, tourism creates a chain of economic activity that affects both those delivering services directly to tourists (and their employees who earn more and can consume more) but also their suppliers, and the suppliers to the suppliers, in an endless economic chain that multiplies the initial amount spent by tourists. This is known as "multiplier effect" (UNDP, 2011) .

people increased in 2007 and reached 1,044 in 2008, due to a shortage of grassland in surrounding areas, caused by the harsh winter. Most herders left from the reserve, and only 358 of them remained in 2009. Since 2010, the number of people within the INNR has been stabilized to approximately 800 (See Table 9).

Table 9. Total number of population within INNR

Year/soum	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Airag	83	101	118	132	132	186	615	210	448	448	483
Dalanjargalan	58	69	83	93	94	132	429	148	321	324	354
Total population	141	170	201	225	226	317	1044	358	769	773	837

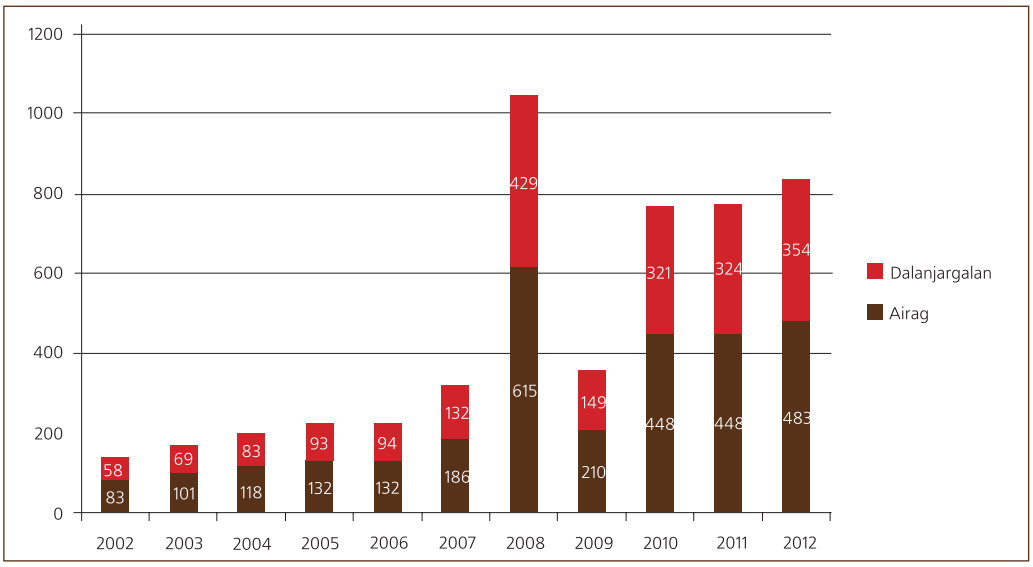
Source: *National Statistics Office data 2002-2012*

The benefit of drinkable water is changeable due to the changing number of people who live within the reserve. In order to estimate the economic value of drinkable water provided by INNR, an average rate of water consumption per person per day from several studies was used. On average, one person who lives in Ger districts or places that are not connected to central water supply system consumes 6.6 litres water per day and 2.42 m^3 per year.

The average prices of water were determined using different sources. For example, Emerton et al., (2009) used willingness-to-pay approach for drinkable water in Ulaanbaatar city to value Upper Tuul Ecosystem and reported that people's willingness-to-pay for one litres drinkable water is 1.36 MNT (0.001 USD).

The ecological and economic value of water studied by Odontsetseg et al., (2010) proposes different values for surface and ground water: surface water is valued in range between 0.35 and 1.62 MNT (0.00026 and 0.0012 USD) per litres; and ground water value ranges between 0.6 and 13.06 MNT (0.00044 and 0.0096 USD) per litres for all 29 water basins in Mongolia[10].

Graphic 4. Total number of herders within INNR



Source: *National Statistics Office data 2002-2012*

From regulatory perspective, there is already legal

[10] Conversion of MNT to USD is estimated using currency exchange rate of 2012.d

document that set up the ecological and economic value of all water sources in Mongolia. Government of Mongolia (2011) approved resolution of ecological and economic value of water in Mongolia. In the first appendix of the resolution, ground water price per litres of Tuul River is 0.944 MNT (0.0007 USD), for surface water it is 1.06 MNT (0.0008 USD)[11]. According to Government resolution, water price in protected areas should be doubled. Please refer Appendix 3 for the water pricing of Government resolution.

Based on the water pricing of Government resolution and number of population in 2012, the estimated benefit of drinkable water for the people who live in the INNR is 11.3 million MNT (US$6.3 thousand) based on number of population in 2012 (Table 10).

The value of drinking water has been increasing but this value is unsustainable in the future due to lack of sustainable management in water use. Therefore current water management within the INNR is one of examples of the BAU scenario.

Between the 2002 and 2013, there was an average increase of 2% in water value. Based on this historical data, we could assume this increase will be continued till 2020 but will be declined by 1.5% after with the BAU scenario. The total benefit of INNR of the drinking water would be 12.07 million tugrigs by 2025 with the INC scenario.

On the other hand, by applying a conservative percentage of increase of 3% increase in the growth of benefit to illustrate the potential economic benefit as a result of INC practices and total benefit will be 18.7 million tugrigs by 2025 (Graphic 5).

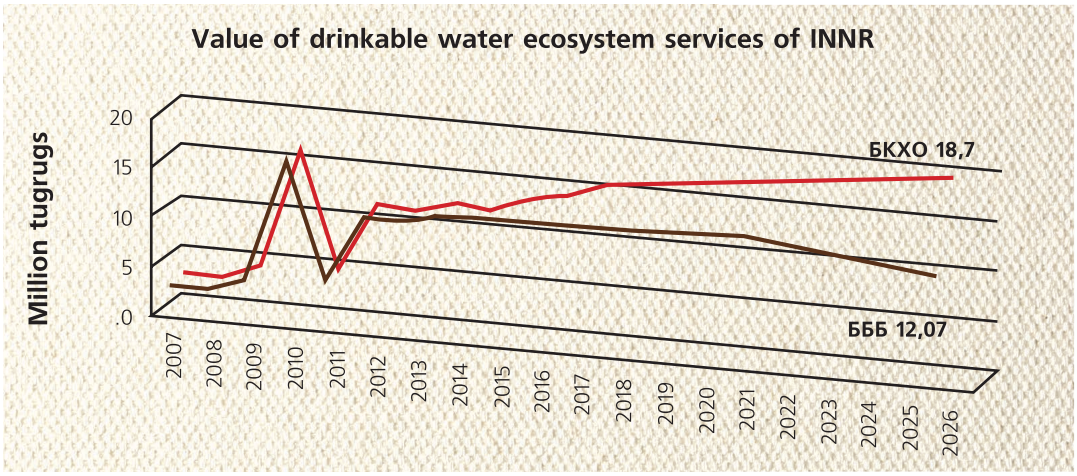
In addition to drinkable water, there is a small fresh

Table 10. Economic benefit of drinkable water for the people who live in INNR

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Water demand m^3	360	435	514	576	578	811	2667	916	1966	1974	2139
Benefit thousand MNT	1,908	2,306	2,722	3,052	3,063	4,296	14,131	4,851	10,415	10,459	11,332
Benefit thousand USD	1.1	1.3	1.5	1.7	1.7	2.4	7.9	2.7	5.8	5.8	6.3

Source: *National Statistics Office data 2002-2012, Authors estimation*

Graphic 5. Economic value of drinking water with BAU and INC scenarios



Source: *Authors estimation 2015*

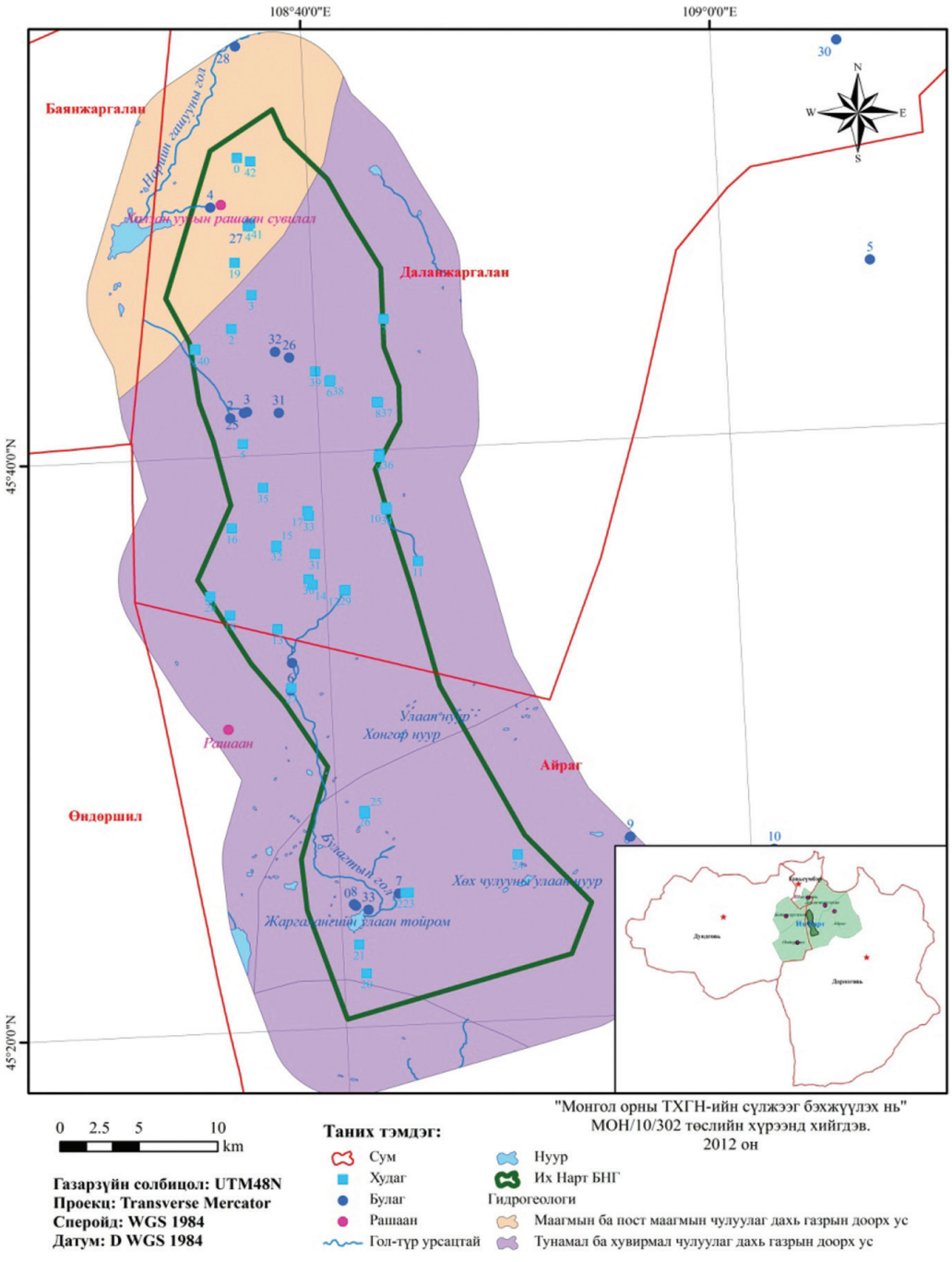
[11] In Annex 3 of the resolution of Government of Mongolia (2011), surface water value per cubic meter was 2,651 MNT (1.95 USD), and it is multiplied by 0.4 as a water equivalent for use of population stated in Annex 2 of the same government resolution that is renewed in 2013. Then price per cubic meter was converted to per litres. The same approach was used for ground water value estimation, but water equivalent is 0.1 and water value per cubic meter was 9,440 MNT or 6.95 USD (Government of Mongolia 2011).

water spa located to the north of the INNR and Khalzan Uuliin Rashaan spa treatment is established nearby. The spa treatment only operates for three months of the year, from the middle of the June until the middle of the September due to lack of comfortable warm accommodation during the cold season.

The government owns the Khalzan Uuliin Rashaan spa treatment resort and approximately 400 people come for treatment from all around Mongolia every year. Khalazan Uuliin rashaan spa treatment has been found to be suitable for the people who have liver, kidney, stomach and mental problems.

The cost of spa treatment is $15 per day per person approximately and the lent of treatment is 10 days in average. Therefore, estimated total economic benefit of Khalzan Uuliin Rashaan spa treatment is 108 billion tugrigs annually. If spa treatment operates all year around, the benefit would be at least four times higher 432 billion tugrigs annually. The lack of investment in the spa generates an estimated economic loss of 324 billion tugrigs.

Map 4. Water sources within INNR



Water for human consumption is invaluable. However, due to the limited number of people living in and around the INNR, the market value (MV) of the water is minimal. Nevertheless, when looking at livestock water consumption, the value of water to the livestock sector is significant, and therefore highly important to local economic growth.

For example, a recent World Bank report (2010)[12] of the Southern Gobi Region estimated that the entire region has approximately 3.8 million head of livestock comprised of 120,000 camels, 260,000 horses, 100,000 cows, and 3.4 million sheep and goats. The indicated report estimates that camels consume an estimated average of 45 liters of water a day, horses consume 35 L/day, cows 35 L/day and sheep-goats consume 4 L/day. This comes to a total of 31,600 m^3 a day for the combined total of livestock in the Southern Gobi Region.

When applying the above indicated water consumption rates per day and the number of livestock within the INNR in 2011, the water use is 394.57 m^3 per day and 144 thousand m^3 per year. In monetary terms, considering a conservative value of USD 2 per m^3 of water, the annual market value is 763 million tugrigs (Table 11). In 2011, there were 837 people living in 242 households and water value for livestock per household is 3.1 million tugrigs per year. In other word, one household saved 6750 tugrigs per day by using free water for the livestock.

Table 11. Water use and value for Livestock consumption within INNR

Livestock	Water Use Lts/day	Livestock Nart bag	Livestock Bichigt bag	Livestock INNR 2011	Water use per day m^3	Water Use per year m^3	Water Value million tugrigs
Camels	45	194	163	357	16.06	5863.73	31.07
Horses	35	2021	1545	3566	124.81	45555.65	241.35
Cows	35	855	746	1601	56.03	20452.78	108.36
Sheep	4	14894	11467	26361	105.44	38487.06	203.90
Goat	4	10838	12216	23054	92.22	33658.84	178.32
Total		**28802**	**26137**	**54939**	**394.57**	**144018.05**	**763.01**

Source: *Authors using data of WB (2010) and INNR Management plan (2014)*

Table 12. Water ecosystem value in INNR, 2012

Drinking Water	11,3 million төгрөг
Spa treatment	11,3 million tugrigs
Livestock consumption	763,01 million tugrigs
Total water ecosystem value	108 million tugrigs
Total water ecosystem value	882,31 million tugrigs

Source: *Authors using data of WB (2010) and INNR Management plan (2014).*

The total value of water ecosystem within the INNR is 882 million (0.88 billion) tugrigs including 11.3 million tugrigs for the drinking water, 108 million tugrigs for the spa treatment and 763 million tugrigs for the livestock consumption. (Table 12)

Despite this important benefit to rural families including drinking water for 837 herders and 54,939 livestock and spa treatment as shown in Table 12, little or nothing is invested in water conservation and management; this is a typical unsustainable BAU scenario.

The characteristics on the drinkable water sector under BAU and INC are shown in Table 13 below.

[12] Mongolia, Groundwater Assessment of the Southern Gobi Region, World Bank, April 2010

Table 13. Characteristics of Drinkable Water Practices in Ikh Nart NR: BAU and INC scenarios

BAU	INC
• Unsustainable management of water sources; • Rapid degradation and dryness of the surface water including springs and lakes due to lack of management; • Unstable and uncontrolled number of people and livestock; • High loss in current business model for the State owned spa treatment; • Water shortage for the wildlife including Argali sheep especially during the natural disaster due to increase in number of livestock; and • Undervalued water price due to a lack of scientific and economic research on quantity and quality of water.	• Sustainable management of water sources; • Slow down in the degradation and dryness of surface water including springs and lakes due to best practice management; • Number of people and livestock will be stabilised and managed; • Profitable business model for the spa treatment; • Sustainable long term water source for wild life; and • Valuable water price based on total size and quality of water aquifer.

4 CONCLUSIONS AND POLICY RECOMMENDATIONS

4.1 CONCLUSIONS

Despite the challenges of having limited information available to the study, the existing evidence found on the economic value of the ecosystems services (ES) provided by the ecosystems of the INNR make a significant contribution to the regional economy. Nevertheless, as in many other countries in the region, resource degradation under BAU, typically, offers immediate returns in the form of marketable products such as livestock; and the negative impact of ecosystem wear and tear under BAU practices may not be visible in the short term but will eventually damage economic growth.

The study concludes that currently, there are significant losses as a result of BAU practices; and that the shift to INC will increase economic benefits. For example:

- Grasslands ecosystems are indispensable to sustain livestock and dairy production in and around INNR. The INNR is an indispensable area where grass is "storage" for the harsh winter periods, and this is key to the survival of livestock. The estimated total annual market value of the ecosystem services for the livestock sector of INNR is 13.4 billion tugrigs. Evidently, grassland resources at the INNR make a significant contribution to alleviate poverty in the region. Livestock is central to support rural livelihoods. The economic benefits from livestock breeding, e.g. sheep and cow breeding, do not come without ecological damage, as is the case of erosion and overgrazing in the concentration areas of INNR. However, further research is needed to determine an accurate level of degradations and its costs to the economy.
- The value of grasslands in the INNR, in terms of the value of the tonnage of hay produced within its area is significant; it is estimated at 1.3 billion tugrigs. This is significant contribution of INNR to the local economy.
- Nature-based tourism (NBT) is important and has a moderate growth potential in INNR, due to competence from other major nature attractions with better accessibility and services. The estimated value of tourism sector is 10 billion tugrigs with the INC scenario. Investment in INC nature-based tourism is lagging behind; there area no sustainable tourism strategy in the region that includes ecosystems management; even though nature conservation fees generates an important annual revenue; and the expansion of sustainable NBT could also contribute to reduce the negative impacts of livestock activities.
- Drinkable water from the INNR is indispensable to human health. Although the number of people living in the INNR is rather small and therefore the benefit in minimal in monetary terms, INNR springs are the only source of clean water for local households and herders. The estimated benefit of drinkable water for the people who live in the INNR is 11.3 million tugrigs anually. With the BAU scenario, the value of water unsustainable and will be 12.07 million tugrigs and if water management improved with INC scenario, this value could be reached 18.7 million tugrigs by the 2025. The annual economic value of spa treatment is 108 billion tugrigs with BAU scenario and 432 billion tugrigs with INC. The lack of investment in the spa generates an estimated economic loss of 324 billion tugrigs annually.
- Water for livestock is indispensable to sustain productivity. In monetary terms, the annual market value of water used to livestock is estimated at 763 million or and a dailyl saving of 6750 tugrigs to each household. The total benefit of water ecosystem within the INNR is 882 million tugrigs annually.

In TSA analysis, the value estimated represent, for example, value of sectoral output, in which an ecosystems service, such as fresh water or grasslands, is one indispensable input. Nevertheless, it is safe to say, that in the INNR, INC is indispensable to sustain the current annual economic benefits such as those indicated above.

The benefit estimations of this report could significantly increase once a more detailed and comprehensive research is carried out, including the production of reliable data and establishment of sectoral baselines. It is also important to note, that this study is not a total economic valuation (TEV); it is a basic targeted scenario analysis (TSA) as discussed in Section 2. The goal of the TSA study, as noted in the summary, is to provide sectoral decision makers from the government and private sector with initial information to facilitate the incorporation of ecosystem services into economic planning, investment policies (e.g. additional financial support to enable the MNPAs to meet the cost of the basic conservation level (now at 32%), corporate business plans, and investment policies at sectoral level..

4.2. RECOMMENDATIONS

Based on the above listed conclusions, the following is recommended:

- Assess the current policy barriers to improve ecosystems management in and around the INNR; based on the results of the analysis, the INNR's administration could increased in collaboration with the soum, aimag government and local herders to mainstream sustainable natural resource management for grassland and water into policies. This may include grass management plans based on an assessment of the adequate carrying capacity of grasslands in INNR considering the needs of endemic animal and plant species.
- Aimag and soums governments could develop a sustainable-tourism business strategy in close collaboration with the private sector and the network of PAs of Mongolia. This strategy could include a full revision of the current entry fee policy; and services and infrastructure development such as walking trails, designated camping areas with amenities and entrance gates to facilitate statistical analysis of visitation.
- Visitor information centres should be established in Airag, Dalanjargalan soums and Shivee-Ovoo train stations; however, an financial breakeven analyses should be carried out prior to develop the information centers in order to ensure their financial sustainability.
- Modernize the INNR webpage and incorporate financial information and economic impact information, and links to the network of PAs; information should be accessible in Mongolian and English.
- Business development in tourism sector should be encouraged by government incentives. Local people should have priority to undertake business using the INNR. For example, assess the viability of establishing transport services to local (Airag and Dalanjargalan soums residents), national and international visitors to the INNR;
- Establish a partnership with the local government and local schools to introduce or improve environmental education curriculum. Students should learn about national parks in their area from a 'hands on' perspective, by visiting and experiencing their local park to develop an understanding of why they are important, and how we can look after them. Also they learn about the management of a national park, the role of a ranger, key environmental issues, biodiversity, habitat, species, and history of ancient Mongolia;
- The development of the spa treatment must be undertaken to allow for year-round access and facilities need to be upgraded to allow for greater numbers to use the facility at any time during the year. This can also be developed with complementary businesses, for example cafes', restaurants, accommodation, and other complementary health providers. Local residents should be employed and provided incentives to undertake this opportunity; and more regular, reliable and flexible forms of public transport need to be developed to enable tourists and patients to fit their visit to INNR and the spa treatment within their visit to the area.
- Assess drinkable water quality of springs used for human consumption and determine the need and extend of spring water protection policies.
- For the water and livestock sector, it is indispensable to assess the conditions of the areas of concentration (next to water sources) and develop livestock access to water policies to ensure sustainable livestock survival and maintaining healthy water sources.

The above listed recommendations are a sample of what is needed to shift from BAU to INC in the reviewed sectors in this report.

For policy recommendations, at national level, refer to the PA Network Level Valuation Repost.

ANNEXES

ANNEX 1. REFERENCES

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ANNEX 2. TSA APPROACH

This study used a basic "Targeted Scenario Analysis" (TSA). It is not a traditional ecosystem-centered valuation approach. TSA is sector-centered and it builds on the approach used by UNDP for the valuation of ecosystems services in the Latin American and Caribbean Region, more recent PA/Ecosystem valuations studies in Central and Eastern Europe, and in the UNDP draft guideline to Targeted Scenario Analysis to be available in early 2014. TSA is a sector-oriented approach, which is relevant to policy makers responsible for sector development and investment policies.

TSA explores the economic relations between production practices, ES, other inputs, and their respective sectoral outputs (values). The approach addresses for example: a) how ecosystem degradation lowers outputs and discusses the associated costs; and, b) ecosystem-friendly management practices that avoid damages and its economic benefits are highlighted. These two different approaches, "Business as Usual" (BAU) and "Investing in natural capital" (INC), are used to facilitate the analysis

and demonstrate the value of ES to productivity. A sample of typical characteristics of BAU and INC in the drinkable water sector is included in the Table below.

Characteristics of Drinkable Water Practices in Ikh Nart NR: BAU and INC scenarios	
BAU	**INC**
• Unsustainable management of water sources; • Rapid degradation and dryness of the surface water including springs and lakes due to lack of management; • Unstable and uncontrolled number of people and livestock; • High loss in current business model for the State owned spa treatment; • Water shortage for the wildlife including Argali sheep especially during the natural disaster due to increase in number of livestock; and • Undervalued water price due to a lack of scientific and economic research on quantity and quality of water.	• Sustainable management of water sources; • Slow down in the degradation and dryness of surface water including springs and lakes due to best practice management; • Number of people and livestock will be stabilised and managed; • Profitable business model for the spa treatment; • Sustainable long term water source for wild life; and • Valuable water price based on total size and quality of water aquifer.

STEPS AND INFORMATION FLOW

Depending on the availability of information, the following steps are recommended to apply the TSA valuation approach:

1. Definition of the scope of the analysis: OVNP.
2. Definition of BAU baseline and potential INC intervention based on available information and first hand research.
3. Selecting indicators (based on available information and agreement with stakeholders).
4. Constructing BAU and INC scenarios and values.
5. Formulation of informed policy and management recommendations.

INDICATORS

Depending on the availability of data, selected indicators are used to assess BAU and INC impact. Sample indictors are shown in the Table below. Not all indicators are suitable for all the selected sectors or subsectors. Therefore, indicators are used when applicable.

Sector Indicators used to construct BAU/INC scenarios
Employment increase (# of jobs) by sub-sector (direct, indirect and induced)
Income, average annual increase by sub-sector
Fiscal impacts (annual tax revenues to governments
Annual revenue from green taxes
Foreign exchange earnings (annual, from exports)
Sector investment (government)
Sector investment (private sector)
Damage costs (as a result from BAU practices
Avoided damages costs (as a result from INC practices)
Production trend (volume and value)
Sector production trend (as percentage of GDP)
Changes in natural capital (e.g. # Ha under protection or INC practices)

CONSTRUCTING BAU AND INC SCENARIOS

Traditional data on the value of ecosystems to the selected sectors is organized based on this BAU/INC framework. The values of biodiversity and ecosystems are not seen as static (time-bound) data points, but, rather, as variables that respond to degradation, sustainable management, and other interventions.

The term BAU refers not to all current activities but those activities that damage or depletes ecosystem services. The BAU approach is characterized by a focus on short-term gains (e.g., <10 years), externalization of impacts and their costs, and little or no recognition of the economic value of ES, which are typically depleted or degraded. Under INC, the focus is on long-term gains (>10 years); also under INC, the costs of impacts are internalized. Ecosystem services are maintained, thus generating potential for a long-term flow of ecosystem goods and services that can enter into decision making. Activities labeled as INC practices tend to support ecosystem sustainability, not for ideological reasons, but, rather, as a practical, cost-effective way to realize long-run profits. Common INC practices include watershed management, agro-forestry and silvo-pastoral production methods, low-impact logging and mining, nature-based income diversification, and organic farming (adapted from Bovarnick et al, 2010).

FORMULATION OF INFORMED POLICY AND MANAGEMENT RECOMMENDATIONS

Once the relationship between the policy interventions (BAU or INC) and outcomes and the magnitude of the outcomes that may result from each of the policy interventions has been estimated, the information could be presented to decision makers in order to assist them at choosing among different the policy options; the choice between BAU and INC.

Some decision makers may want to know the analyst's opinion or seek a direct recommendation as to which policy intervention to choose on the basis of the TSA. Decision makers may promote debate before supporting one policy intervention over another. Others may prefer a more "factual approach" in order to come to their own conclusions as to the choice among policy interventions.

In both cases, the analysis should present the results of all indicators, for all affected stakeholders, in a way that enables the decision maker to compare and contrast the pros and cons of the different interventions in terms of different criteria and the consequences on different groups. The main trade-offs between indicators and stakeholders should be highlighted, without presenting a dominant intervention or single number that indicates which intervention "should" be chosen (UNDP TSA) [13].

LIMITATIONS

The sector-level approach and the BAU and INC analysis have some limitations for instance:

- The analyses draw on technically economic and ecological data from the published material available. Such date is still scarce in IHNR/ Mongolia, just a handful of studies are available.
- The sectoral approach disaggregates the economic value of each type of ESS and fragments system-wide values to show specific sectoral inputs.
- Lack of national and sector-level data has limited the applicability of the selected range of indicators used to assess the impact of BAU and INC practices.
- When available data is mostly out-dated, few current data from recent years is likely to be available.

[13] UNDP Targeted Scenario Analysis (2013)

ANNEX 3. ESTIMATION OF WATER VALUE BASED ON GOVERNMENT RESOLUTION, 2011

№	Water Basins of Mongolia	Base Value of Water (MNT/m³)[A]		Water Equivalent Coefficient (WEC) for Human Drinking Consumption[B]		Value of Drinking Water after conversion by WE (MNT/m³)		Value of Cubic Meter Drinking Water linked to PAs (MNT/m³)[C]	
		A		B		C=A x B		D=C x 2	
		Surface water	Ground water	Surface water	Ground water	Surface water	Ground water	Surface water	Ground water
1	Selenge River Basin	1,050	4,072	0.8	0.2	840	814	1,680	1,629
2	Khuvsgul Lake and Egiin River Basin	1,507	1,438	0.6	0.6	904	863	1,808	1,726
3	Shishkhed River Basin	1,050	1,337	0.8	0.6	840	802	1,680	1,604
4	Delgermurun basin	1,050	1,510	0.8	0.6	840	906	1,680	1,812
5	Ider river basin	918	1,510	0.9	0.6	826	906	1,652	1,812
6	Chuluut river basin	918	1,510	0.9	0.6	826	906	1,652	1,812
7	Khanui river basin	1,347	2,311	0.8	0.4	1,078	924	2,155	1,849
8	Orkhon river basin	2,783	4,945	0.4	0.2	1,113	989	2,226	1,978
9	Tuul river basin[D]	2,651	9,440	0.4	0.1	1,060	944	2,121	1,888
10	Kharaa river basin	2,183	2,764	0.5	0.3	1,092	829	2,183	1,658
11	Yeruu river basin	1,424	2,764	0.7	0.3	997	829	1,994	1,658
12	Onon river basin	1,225	1,663	0.7	0.5	858	832	1,715	1,663
13	Ulz river basin	1,478	2,780	0.7	0.3	1,035	834	2,069	1,668
14	Kherlen river basin	1,791	2,835	0.5	0.3	896	851	1,791	1,701
15	Buir lake and Khalk river basin	2,097	2,081	0.5	0.4	1,049	832	2,097	1,665
16	Menengiin Tal basin	1,013	3,700	0.8	0.3	810	925	1,621	1,850
17	Umard Gobiin Guveet-Khalkhiin Dund side basin	1,420	3,700	0.6	0.3	852	925	1,704	1,850
18	Galba-Uush doloodiin Gobi basin	1,420	3,996	0.6	0.3	852	999	1,704	1,998
19	Ongi river basin	2,240	3,250	0.4	0.3	896	975	1,792	1,950
20	Altain Uvur Gobi basin	1,410	4,433	0.7	0.2	987	887	1,974	1,773
21	Taats river basin	1,410	1,939	0.7	0.5	987	970	1,974	1,939
22	Orog lake and Guin river basin	1,410	1,939	0.7	0.5	987	970	1,974	1,939
23	Buun tsagaan lake and Baidrag river basin	1,522	2,352	0.7	0.4	1,065	941	2,131	1,882

24	Khyargas lake and Zavkhan river basin	1,675	2,716	0.6	0.3	1,005	815	2,010	1,630
25	Khuisiin Gobi and Tsetseg Lake basin	1,122	2,352	0.7	0.4	785	941	1,571	1,882
26	Uyench Bodonch river basin	800	2,506	1.0	0.3	800	752	1,600	1,504
27	Bulgan river basin	800	1,729	1.0	0.5	800	865	1,600	1,729
28	Khar Lake and Khovd river basin	1,747	2,506	0.5	0.3	874	752	1,747	1,504
29	Uvs lake and Tes river basin	1,195	2,506	0.7	0.3	837	752	1,673	1,504
Average value of water value[D]								**1,838**	**1,756.0**
Weight (Share of water consumption from surface and groundwater)[E]								**0.4**	**0.6**
Weighted average value of water[D] (MNT/M³)								**1,789**	

[A] - Appendix 1 of Government Resolution, 2011

[B] - Appendix 2 (2013) of Government Resolution, 201[1]

[C] - It is stated that if the water consumed within any Protected Area in Mongolia then the water value is estimated to be two times higher (Appendix 2 (2013) of Government Resolution, 2011)

[D] - When estimating average value of water, we excluded the value of Tuul river basin. Because, the estimated weighted average value of drinking water is to be used for estimation of benefits of consumption of drinking water in areas except Ulaanbaatar, in which the Tuul river is the main water source.

[E] - 60% of the total water consumption in Mongolia is from groundwater and remaining 40% is from surface water (Tdashi & Maki, 2004)

Source: *Authors estimation; Government Resolution, 2011*