Analysis of:

SECTION B: BASELINE ASSESSMENT

CHAPTER B7a: BIODIVERSITY

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PS6 – protect/conserve biodiversity; maintain benefits from ecosystem; promote sustainable management

The flora analysis that ESIA cites as "well studied" in the past "decade" (Page 16) is, in fact, mis-leading. They have only cited four (4) studies in the area by these authors. In addition, they cite, as an example, of extensive studies of "1,400 10x10-m plots" of the Gobi A and B areas (Page 16). In fact, this extensive data collection is only 0.14 km^2,whereas the area of Gobi B, alone, is approximately 9,000 km^2 in area (Souris et al. 2007). Additionally, the area is smaller than the expected area of influence around the project 15,000 km^2 (ESIA p. 106);this does not take into account the indirect/cumulative impact area of 46,000 km^2 (ESIA p. 106). This would mean that their flora analysis is based on less than 1% of the area of the potentially affected area.

Furthermore, the ESIA cites work that dismisses the area as "poor" in plant species richness (e.g. number of species present; Pag 16). Unfortunately, the cited work (Von Wehrden et al. 2009) does not mention the fierce on-going debate in the ecological literature examining the relationship between ecosystem stability and plant species present. There is plenty of evidence that plant species richness is affected by disturbance (see review: Worm and Duffy 2003). If there are few endemic species, the causal relationship between disturbance and species richness cannot be determined by the work ESIA cites. Since Von Wehrden and colleagues' work was purely observational and non-experimental, we cannot know the level of stability of the ecosystem and flora.

There is not enough work done (although extensive work, hundreds of high profile papers have been published) to know what the relationship is between biodiversity and ecosystem stability (McCann 2000). The fact that there are few endemic species already highlights a problem of long-term stability. The fewer species in a system the less stable the system is (McCann 2000). In an extensive, 21 study review, data supported the notion that in an already highly productive environment, such as tropical forests, the higher the number of species the more productive and stable the system (CBD 2009). The deserts of southern Mongolia are already sparsely populated, disturbance will almost definitely change the ecosystem; a mining operation may create a permanent stable ecosystem: one where there is no productivity (e.g. death of all wildlife species).

A basic oversight of the ESIA is the effect of climate change and predicted changes that may occur. Mongolia is currently on pace for significantly higher increase in temperature than the global average. The temperature increase in Mongolia over the past 50 years has been documented to be 1.8°C (whereas the global average is 0.65°C; Namkhaijantsan 2006). There is no conclusive data that shows how climate change (e.g. increased temperatures, increased variability of precipitation) will affect wildlife (particularly plants) and especially of the studies done in Mongolia (Liancourt et al. 2012).

The ESIA takes on a strategy to present purely descriptive data from limited literature. The key issue that the ESIA glosses over is the impact of the disturbance and how the disturbance will *interact* with the current ecosystem. There is a broad subfield of ecology that examines exactly this issue: additive vs. non-additive effects. In other words, We know from extensive experimental and theoretical studies, disturbance is likely to favor the few species that can adapt to the changing conditions (Worm and Duffy 2003). In addition, where ecological stressors are high (e.g. drought, ephemeral running water, low nutrients, high metal content) can push an ecosystem to further degradation of the environment.

The birds of southern Mongolia would be most at risk due to power lines/infrastructure that would be required by this project. The bustard is known to have a more limited field of vision compared to other large birds (Martin and Shaw 2010). Janss and Ferrer (2000) also found that among the birds crossing power lines, the bustard had the highest likelihood of colliding with power lines. The co-existence of bustards and power lines is unlikely to be mitigated by current power line design. The bustard's field of vision is the main culprit (Martin and Shaw 2010).

There are six (6) endangered species and vulnerable species, either by National categories or IUCN categories (ESIA table 7.4). Importantly, the ESIA overlooks a critical aspect of conservation biology: meta-population dynamics. Meta-population dynamics describes how individuals migrate between population sources to population sinks (Hansson 1991; Anderson et al. 2009). Although populations of plants and animals may be found elsewhere, there is immigration and emigration between patches of population. Only describing the current, static, state of the populations does not fully reveal precarious stability of these animals. Spatial scale figure (4.5.1) does not accurately portray the differences in services at different spatial scales. Carbon sequestration, in the form of storage is important at all levels. Pollination is also important at all scales, although it occurs "locally" each locality differs in what factors control pollination (e.g. climate, plant species).

The area is not well studied and in response to Criterion 5, it is not possible to make any recommendations. The evolutionary processes (unique or unusual) are not known; desert ecosystems, although seemingly harsh and with few visible on-going processes, is a system that is well distributed across the globe. There is a large literature that examines the conservation costs of rehabilitating desert systems and it proves to be "ecologically and economically difficult" (Fleishman et al. 2003). The lack of ecological/evolutionary processes is not encouraging.

Criterion 6 underestimates the impact of global climate change regulation, since I have already documented the greater than average increase in temperatures in Mongolia (Namkhaijantsan 2006). Mongolia is projected to experience great change in their ecosystems in the next 70 years. Specifically it is projected that there will be biome switching (Batima et al. 2006). The south is expected to see increased desertification (Batima et al. 2006). There will be a great deal of consequences to ecosystem services such as carbon storage.

Additionally, Criterion 7 overlooks the interactive effect of current climate change scenarios. The region cannot be viewed in isolation. The most recent projects (Batima et al. 2006) predict that much of Mongolia's forests will switch to grasslands or deserts. Combined with projected population growth estimates doubling of the population by 2050 (United Nations 2011) coupled with the shrinking of the forests (Batima et al. 2006), ecosystem services will be strained. This is not trivial, especially considering the increasingly sedentary society as the decades pass. Rehabilitation of mined areas are difficult, as stated above (Fleishman et al. 2003), thus if there is ever a need to utilize the massive area of the southern Gobi, without proper monitoring, the Gobi will not be an option.

Commentary:

The ESIA does not seem to provide answers to key conservation considerations (e.g. meta-population dynamics) that would seem to be essential in assessing if IFC PS6 standards are being met. The ESIA attempts to address these issues by asserting "biodiversity monitoring" would be sufficient to ensure meeting PS6 standards. Unfortunately, even the ESIA acknowledges, that some losses in terms of ecosystem services and biodiversity will not be offsetable. The only way to find out whether losses will be offsetable or not, as set forth in the ESIA, is when the loss is incurred; it is plain for anyone reading this document that at the point when it is discovered that a loss is not offsetable, it is, in fact, not offsetable. The point of PS6 would be to show prior to activities whether losses will be offsetable.

Of course my understanding of the ESIA is strictly focused on the plant/animal ecological aspects. The geological and hydrological aspects are tantamount and hopefully are being considered with equal importance. From what I understand about this mining expedition, it will not be stopped; but the lack of detail in the proposed monitoring programme is alarming. There will need to concerted efforts, including planning, to ensure proper monitoring, especially given the destructive nature of mining.

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