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Bosscha Observatory: Challenges as a scientific heritage of astronomy in Indonesia

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Abstract. With over 80 years of existence, Bosscha Observatory in Lembang, West Java, Indonesia, still stands as one of the largest observatories that is registered by International Astronomical Union in the South East Asia region. Since first commissioned by the NISV (*Netherlands Indische Sterrenkundige Vereeniging*), Bosscha Observatory had played a major role in astronomy, particularly in research and observational activities in the southern hemisphere. But the current development has produced a serious impact on Bosscha Observatory, both tangible and intangible. With the challenges Bosscha Observatory faced the past decades, what can be done in the future to conserve not only the tangible value but most importantly the intangible value it embraces for the scientific development? This paper emphasizes its values, and opens some perspectives and ideas for conserving a (candidate to) Astronomy and World Heritage site. This important issue of how to best preserve the scientific value of this scientific heritage it embodied is discussed in some detail.

Keywords. Bosscha Observatory, astronomy, scientific heritage, tangible aspect, intangible value, conservation.

1. History of Bosscha Observatory and its legacy for the future

The distinctive facts about Bosscha Observatory are being one of the largest observatories for astronomical research in the South East Asia region and the central playground of astronomy in Indonesia, besides playing a very important part in the history of astronomy in the East Indies and being acknowledged by the international astronomical scientific societies.

The interest on double star studies and the sky of the southern hemisphere had triggered an idea to establish an observatory in the Dutch East Indies. It was initiated and largely funded by K.A.R. Bosscha, a land master of Malabar tea plantations in 1923 and by Dr. J. Voute. It was finished in 1928. Many international astronomers worked there and published their results back in their home countries. Anton Pannekoek (1929) explained the important value of Bosscha Observatory: "*The legacy has been left to the Observatory destined to extend hospitality as "research associates" to astronomers from Europe and America* [...]".

Among the achievements and accomplishments in over 80 years, the scientific research conducted at Bosscha Observatory supported the findings and scientific developments in the specific area of the Southern hemisphere's *terra incoqnita*, unchartered skies, and of course in double star astronomy. International astronomers from many parts of the world

and their works showed how Bosscha Observatory played an important international role since its early years, and also in developing an international scientific culture. This is a positive signal in the process of reaching an independent scientific tradition which has been discussed in Basalla (1967)'s ideas on the third phase of a preliminary model describing the spread of Western modern science to the Eastern cultures.

In 1950, after the Indonesia's independence, the Dutch handed over the observatory to the Government of the Republic of Indonesia. It was soon followed by the establishment of the Department of Astronomy, Institut Teknologi Bandung (ITB). Another result of Bosscha Observatory's activities was the birth of an education place to share and develop the science of astronomy independently in Indonesia. Finally, after seven decades of its existence, Bosscha Observatory was awarded the distinction of being a National Heritage site in 2004, which gave Bosscha Observatory a new presence in the community.

2. Bosscha Observatory and its rôle in astronomy in Indonesia

The recent generation of professional astronomers is in fact, *per se*, a product of Bosscha Observatory, since there are no academic institutions providing astronomy other than the Department of Astronomy, Institut Teknologi Bandung (ITB).

At first, the main topics of astronomical research and observations at Bosscha Observatory were focused on double star and galactic structure, while more recently the focus went into various topics, such as cosmology, galactic structure, visual double stars, variable stars, stellar evolution, stellar and planetary spectroscopy, the dynamics and evolution of the solar system and extrasolar planetary research†.

In the past few years, curiosity for astronomy has grown, which means that people are increasingly aware and attracted to astronomy. This can be seen through the evolution of the number of visitors to Bosscha Observatory, as the average number has reached 60,000 per year, in the past 4 years (Bull. Obs. Bosscha 2007).

Unfortunately, after so much time devoted to fulfill the public's curiosity and so much compromises and efforts from the observatory, the expected result in public's scientific understanding have not succeeded yet. The public visits merely to see Bosscha Observatory as an object, but not to study and understand astronomy further. On the other hand, it seems that the public perception of Bosscha Observatory as one of an interesting tourism object in Bandung is increasing. This perception can be seen from the various television media coverage that included the observatory in touristic visits and travel programs.

In the past three years, there were also several events held at Bosscha Observatory for public activities in astronomy, such as the inauguration in the observatory complex of the *Kerkhoven House*, currently the first Museum of Astronomy in Indonesia‡, a meeting on archaeo-astronomy¶, and also a meeting of the HAI (Himpunan Astronomi Indonesia/Indonesian Astronomical Union‖. Clearly Bosscha Observatory has focused much of its energy for the general public.

3. Challenges on scientific heritage

The rapid economic and social changes have lead to the sad situation that this heritage territory is under serious threat. Bosscha Observatory's surrounding sites were developed

† see `http://bosscha.itb.ac.id`

‡ `http://langitselatan.com/2007/12/18/wisma-kerkhoven-museum-astronomi-pertama-di-indonesia`

¶ `http://langitselatan.com/2008/06/11/menggali-kekayaan-astronomi-dalam-kearifan-lokal`

‖ `http://langitselatan.com/2008/04/13/pertemuan-para-pecinta-langit-malam-di-wisma-kerkhoven`

very quickly. This has caused light and particle pollution that affect the sky quality for observational activities.

In September 2008, Bosscha Observatory was designed as a *National Vital Object in Cultural and Tourism* (*Obyek Vital Nasional Bidang Budaya dan Pariwisata*) by the Regulation of the Ministry of Cultural and Tourism No:PM.34/HM.001/MKP/2008 of Securing the National Vital Object in Cultural and Tourism. It can be perceived that Bosscha Observatory is a vital object for Indonesia's culture and tourism sector –not in science and research development– as Bosscha Observatory had actually mentioned its position in its vision as a scientific heritage site. Bosscha Observatory's main rôle is stated in its official website (which can be translated as): "*Bosscha Observatory is the first modern astronomy research institution in Indonesia. This observatory is managed by Bandung Institute of Technology (ITB) and carried the responsibility as facilitator for astronomical research and development in Indonesia and to support the education of undergraduate and graduate degree of astronomy in ITB, also to provide public service activities.*"

Support for Bosscha Observatory also comes from the international community. Kuiper mentioned his optimistic hope: "*It is to be hoped that after the liberation of Indonesia the Bosscha Observatory may resume its rightful place in the cultural life of that country*", and its possible development opportunity for the future of Bosscha to became a leading research observatory in the world: [...]"*with spectrographic equipment could be added a well balanced and modern research institution would be created that could maintain a front-line position in the study of Universe.*" (Kuiper 1944).

After four decades, when Bosscha Observatory celebrated its 60th anniversary, IAU Colloquium 80 held devoted to astrophysics of binary stars, for which by international acknowledgement, Bosscha Observatory has a quite complete suite of instruments. van der Hucht (1983) offers a challenge and opportunity in (international) double star research: [...]"*we suggest to make a plan for a new modern telescope a reflector with a primary mirror of about 2 m in diameter and with a modern spectrograph/detector combination for radial velocity measurements,*" which was received with great enthusiasm in Indonesia, and it is hoped to produce a more elaborate view on this project in the future (Hidayat 2004). Unfortunately, it never got a chance to be realised to this day.

These might be the challenges for Bosscha Observatory as an astronomical research center and also as a scientific heritage. How does Bosscha Observatory preserve its value as the center of excellence of astronomy in Indonesia, and, at the same time, manages an exchange program between international astronomers to contribute to the progress in astronomy?

4. Some perspectives and ideas

It is about time for Bosscha Observatory to firmly position itself, in roles and activities. It needs to get out from finding problems. What direction should it lead to? A public observatory for scientific tourism or a research observatory? Or perhaps a combination of both? Here are some recommendations:

(*a*) Bosscha Observatory as a scientific research center for astronomy in Indonesia. Should Bosscha Observatory decide to keep its track as a pure scientific research center for astronomy, there will be many challenges. Among the many reasons for this we find: (*i*) because Bosscha Observatory cannot unattach itself from the community. As a national heritage site, Bosscha Observatory belong also to the community, either as a scientific institute or for disseminating science; (*ii*) there will be objections from the public, or local amateur astronomy societies, who rightly rely on Bosscha Observatory as the learning

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center of astronomy; (*iii*) recent threats on physical and surrounding sites (degrading sky conditions for astronomical observation caused by light and particle pollutions (Hidayat 2008) as two major examples) need critical action; (*iv*) because of its historical position as one of the pioneers on observations in the Southern Hemisphere, it belongs to the international astronomy community. Bosscha Observatory as Scientific Heritagesite could not perform the social and cultural (direct) service for general community in this case.

(*b*) Bosscha Observatory as a public observatory and astronomical (science) tourism destination in Indonesia

Whenever an "site" is nominated as a (cultural/natural) heritage with its potential value, why it then (always) becomea a 100% tourism destination? Is it because public recognises its value as such?

If Bosscha Observatory decides to open for public outreach and serves only as a public place –as a public observatory where people are free to enter and observe– what will happen to research activities by professional astronomers? Several issues will have to be discussed: should the Government build another observatory for pure research? Or simply minimise sky observations?

The concepts for a tourism development and management plan for a scientific heritage site should contain a view on the scientific analysis, and an assessment on its natural and cultural values (ICOMOS 1964, 1999). A well-defined, serious, research-based (BPPI 2003) and visionary tourism design and planning concept –which is relevant to the heritage's characters– is important in order to achieve an harmonious, sustainable new environment which is not opposed to the conservation concept in general.

A proper implementation should bring a positive mutual symbiosis that will benefit many aspects such as: the heritage itself (its well-known history, a cultural appreciation of it and a successful preservation with a good technical maintenance on its physical conditions as well); the physical development of its surrounding areas; and the social-cultural development of the nation in general. This will accumulate the autonomous economic development which will affect autonomy and national income as well as opportunities for the surrounding local residents.

(*c*) Bosscha Observatory as a research and public observatory in Indonesia

If Bosscha Observatory needs to finance itself, a proper combination between a research institution and a tourism site could be formulated. At the same time with a new management of this astronomical research center, the preservation and conservation plan could also be developed towards a sustainable (tourism, or any policy chosen) development concept. Active collaborations in scientific research with other astronomical institutes, and public programmes that are suitable for specific visitors on astronomical science will clearly enliven the legacy.

As an idea, if the observatory needs to share a schedule between public visitors activities, then astronomical research should also be conducted in alternative ways, such as fewer observational activities, but many more in other subjects.

A scientific heritage present in physical form is the data from over 80 years that are kept in the observatory's databases and library. These sets show the unique character of the observatory as it gathered them from the sky above the observatory. Preserving the data is not only preserving the tangible, but alsothe intangible value of astronomy to the next generations.

Collections of valuable old books (some even written in Cyrillic), archives of correspondence letters from the first international astronomers, and the complete collections from the very first to the most recent scientific journals in science and astronomy are some of the treasures. Therefore, it is important to inherit and to preserve this invaluable heritage

of knowledge. It could be the proper gauge for Bosscha Observatory in establishing itself in astronomy for years to come as well as a Scientific Heritage site.
Whatever option is decided, it would certainly need a special analysis process, such as a national survey, with an in-depth research, to decidethe outcome, because it is crucially related to the future development of astronomy in Indonesia. There should be a clear vision from the astronomers themselves about which direction they wish to choose.

5. Bosscha Observatory as a scientific heritage of astronomy

According to UNESCO's *World Heritage Convention concerning The Protection of The World Cultural and Natural Heritage* (UNESCO 2008a), issues linked to scientific and technological heritage are recommended here. It is found that there is no any specific explanatory guidance on how to manage and conserve a scientific heritage in a sustainable way. There is only an identification guidance to nominate the property as a scientific and/or technology heritage. Therefore it opens an opportunity for a discussion regarding this crucial need to preserve and conserve scientific heritages around the world.

As a heritage site, of course, it also has an historical value. Within the conservation context, the history of an historical property (monuments, groups of buildings, sites) itself is not to be perceived as to dis-activate the heritage. The historical background should enrich our understanding towards the heritage site itself. We can use this as a basic resource to treasure, to induce a new understanding, and therefore we could propose and develop a creative specific conservation plan that includes the unique characteristics and values of the heritage it embodies.

By using the guidelines from World Heritage Convention in 1972 (UNESCO 1972), Bosscha Observatory could be recognised as a scientific heritage site (for Astronomy and World Heritage): *Bosscha Observatory is a cultural (and/or scientific) heritage that consists of group of buildings and sites which are of outstanding universal value from the point of view of astronomy*. Bosscha Observatory's groups of buildings and its sites (the land and the air/sky above) within a 2.5 km radius are linked together. The natural landscape supports the scientific value for astronomical research and observations. *Therefore, there is a strong link between the tangible and intangible aspects of the Observatory and especially the intangible nature of "great ideas" may constitite a particularly strong case*. (UNESCO 2008b).

At the moment, Bosscha Observatory as a scientific heritagesite with its special character is a *living heritage*. From our point of view, a living heritage means that it is still running its function (or partly in function) whilst carrying at the same time activities for the public. Therefore, a study and research to initiate a proper conservation plan for such a "living" scientific heritage site should be conducted very carefully. The special values of each heritage should be treasured, and studied carefully in order to design and develop specific (scientific) programmes and activities which are best fitted and could sustainably function to face the pace of globalisation and rapid developments in the world.

There should be a different approach for managing a *living heritage*. To conserve, revitalise such a scientific heritage it needs to live, to grow in a sustainable environment. History needs to be re-interpreted, re-produced, re-told without losing its meaning and legacy, as to keep it alive through decades. How it can still perform its function, develop it and carry out its outstanding universal value for the science itself as well as serving to the knowledge for the general public, for the humankind of the future: as a research center, and also for the surroundings (local community, the nation and the international communities)? This should involve public outreach, a join cooperation among the public, amateurs and astronomers, as well as from heritage institutions and other parties.

6. Epilogue

It is our responsibility to actively participate in saving Bosscha Observatory. The observatory needs to be saved, its value revitalied and its legacy continued. As the only national scientific heritage site, there is a duty to preserve and conserve this precious heritage. Conservation is not just about preserving old artifacts or symbolising its physics as a (colonial) architectural heritage or as any physical image people may mis-interpret or mis-understand. It needs an integrated development plan for a more sustainable environment that could grow harmoniously with its surroundings. Bosscha Observatory deserves a better future that will bring positive impacts especially in astronomy, and more generally in the culture.

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