Initiative to Build an Astronomical Museum in Indonesia

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In the developed countries, it is common to see science history museum that plays important role in collection, research and education. Science Museum conducts dynamic activities in public education through exposition of its collection. Lack of this kind of museum in Indonesia could be understood since the Republic is still 'young'. Scientific activities in Indonesia are not really established until early 1980s.

Astronomy as a practical science has been developed and practiced since our ancestors. It has been noted that in Indonesia, science based astronomical activities was conducted in the 16$^{\text{th}}$ century, when Frederic de Houtman carried a mission to map southern hemisphere and successfully made astronomical observation in Atjeh Province. Professional astronomy activities in Indonesia have been marked by the establishment of Bosscha Observatory as astronomical research institute in 1923. Until now this observatory is still the largest in Indonesia.

This article discusses an idea of a science museum at Bosscha Observatory not only as a collection of objects and artifacts but also as a story teller of science history and effective means for science education to visitors. The basic idea is to create a museum as an institution with unlimited time relevance. The Observatory has been conducting surveys to current visitors that reached up to 65000 persons per year and concluded that exhibition of collection of instruments would be beneficial to scholars in all range of age to learn and appreciate science in Indonesia.

1. Introduction

Indonesia is an archipelago country with more than 17,000 islands spread over three time zones (UT+7, UT+8 and UT+9 hours). It is populated by over 250 million inhabitants and is united with a national language, the so called *Bahasa Indonesia*. With various religions, Indonesia is a country enriched by many ethno-religious practices.

Astronomy in Indonesia is believed to be initiated in the 16$^{\text{th}}$ century when Frederic de Houtman carried a mission to map southern hemisphere and successfully made astronomical observation in Atjeh Province. Bosscha Observatory in Lembang has been known by Indonesian people since the 1920s. On other aspect, a well-known expedition of total solar eclipse observation in 1920s in Sumatra Island was recorded as shown in Fig. 1. [1]

Indonesian scholars made acquaintance with the Observatory since 1959 when the Observatory was transformed into the Institut Teknologi Bandung (ITB). The Observatory since then has been used as the teaching and research laboratory at the tertiary level.

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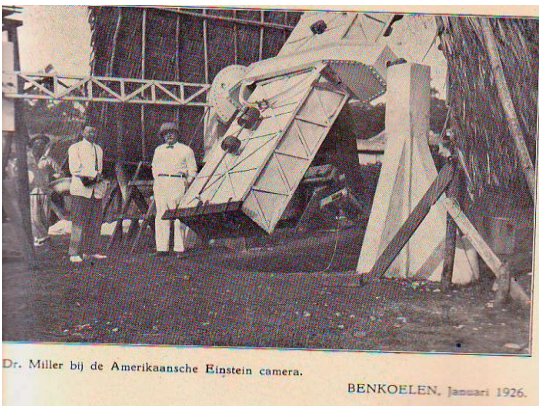

Fig. 1 An expedition for total solar eclipse in Bengkulu Provice, Sumatra, January 1926 (Hidayat, B, Private communication, see also [1])

Fig. 2 The commissioning of Bosscha Observatory in 1928 (B. Hidayat, private communication, see also [1])

The Observatory has been transformed from private owned observatory onto a professional observatory owing to the sophisticated instruments purchased KAR Bosscha in 1923 [1]. The whole construction was completed in 1928. Since then, the Observatory has been solely used for astrometric work in particular, on visual double stars. Fig. 2 shows the snapshot of the event on the commissioning of Bosscha Observatory in 1928.

Since late-1950s the Observatory has been constantly equipped with new instruments with emphasize on photometric and spectroscopic observations. The Observatory serves as the main teaching and research laboratory for tertiary level education in Astronomy and Astrophysics.

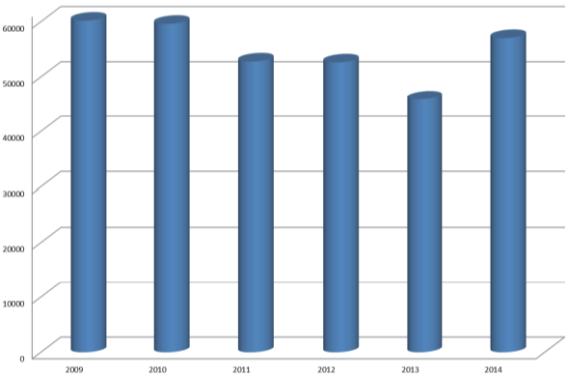

Fig. 3 Number of visitors to Bosscha Observatory 2009-2014 (Source: Bosscha Observatory Public Visit Office)

2. The Evolving Astronomy in the Country

Bosscha Observatory has been contributing to the development of education in sciences for Indonesian. It is also an active contributor to the advancement of astronomy and astrophysics in the region. By affiliating itself to the university, supported by motivated human resources and constantly renewed instruments, the Observatory impacts beyond astronomical community. In the course of ninety years it serves as barometer of astronomical education and research in the country. The Observatory along with other agencies are serving university's students at all level who are conducting observational researches for their graduation theses or publications. Given the geographical advantage, the Observatory is also providing supports for world-wide coordinated observation such as lunar and planetary occulations [2]

The Observatory for long time has been the main destination by pupils all around the country for astronomical education. Despite lack of Astronomy in the middle level education curriculum, it has been a popular subject for the pupils and general public. Astronomy has been gaining interest in particular since Indonesian constant participation in the international Astronomical olympiad events.

Since 2000s the Observatory has been broadening its function for both research and public education.

3. Roles in Public Outreach

As depicted in Figure 3, there is a remarkable increase of number of school pupils visiting the Observatory.

A qualitative survey and general public hearing conducted in various events has led to an increasing pressure from public, in which teachers of basic sciences in the high schools should be trained by astronomers on elementary astronomical subjects. The need to build a new observatory with national scale has also been emerging. To respond this, a task force with various disciplines coming from several institutes has been formed to start making feasibility study to build national observatory in the eastern part of Indonesia.

The idea of having a museum to expose history of Astronomy in Indonesia is indeed very timely. Along with the inauguration of National Education Museum in 2013 at the campus of Indonesia Education University in Bandung [3], a significant

Fig. 4 Wisma Kerkhoven, a Faculty House in Bosscha Observatory that hosting the small museum (*upper*), and the entrance decorated with a stone carved with zodiac (*lower*). Source: http://bosscha.itb.ac.id

feedback coming from the visitors on the need for a unique museum to display chronological development in astronomical science in Indonesia. There are many fascinating period of astronomical endeavor and discovery throughout the history that should be exposed to the younger generation.

4. Road to an Astronomical Museum

It is agreed that an astronomy museum at Bosscha Observatory should not only be a collection of artifacts, old documents and instruments, but also as *a story teller* of history of astronomy and provides effective means of science education to a large number of visitors. With the spirit of "Preserving an Observatory; Respecting the Past and Preparing the Future", a team led by P.W. Premadi. Team consisting of Y. Yulianty, initiated this in 2007. It started with two small rooms at the faculty house (so-called "Wisma Kerkhoven") within the Observatory (see Fig. 4).

The major part of the work is to identify and to understand the various artifacts, documents and instruments. Some of them are without clear description. Tracing various documents, older catalogues of instruments and observation log-books, interviews with older generation of astronomers in Indonesia and in the Netherlands have been the method of work. A very substantial assistance from a science museum and observatory in Leiden proved to be crucial in clarifying a number of issues as well as introducing basic idea of setting up an astronomical museum, caring for antique instruments and documents. Certainly the rooms within the faculty house is not sufficient to host a large number of collection comprises of artifacts, documents and instruments as shown in figure 5.

When the Observatory attained its 90^{th} anniversary in 2013, the entire museum

Fig. 5 Collection of the museum, the 1884 Secretan telescope (*top*), chronometers (*middle*) and 19$^{\text{th}}$ century journals *(bottom)*. Source: http://bosscha.itb.ac.id

Fig. 6 The National Education Museum in Bandung. (Photo credit: J. Aria Utama)

collections are housed in a building, formerly used as observer house, with number of rooms. The museum is also widening its scope of function where:

1. a section of museum is dedicated to the study of light
2. a teacher training program is developed to be part of high school physics curriculum

Obviously this should be managed properly by embracing modern museum management style.

5. Collaboration with Neighboring University

Transforming a house to be the astronomical museum poses several problems in the near future. The present building is under capacity to host a large number of incoming visitors. Under the ministry decree, the Observatory is not allowed to build new building. Having a museum within the observatory complex would be beneficial since visitors would also like to learn the Observatory as it is preserved, and the contents. [4]

It is thought that collaborating with the National Education Museum at the Indonesia Education University (*Universitas Pendidikan Indonesia*) in Bandung City (see Fig. 6), where replicas of artifacts and instruments can be displayed will be of mutual benefit for the visitors who come to Bandung city to have an efficient course of excursions with educational contents.

The National Education Museum was launched in May 2015 by the Ministry of Education and Culture, Republic of Indonesia. It is benefited from a newly designed, with universal aspects, building and furbished with state of the art exhibition, audio-visual equipments. The history of education has been recorded and presented by means of conservations, education and research, and with the support of "Leading and Outstanding" recreational activities [3].

6. Concluding Remarks

The combination of exposure of materials of time past with modern materials wrapped in programs closely relevant to current learning material incorporates modern instruments & technology would make the museum a venue of learning for

any age to comprehend and appreciate the development of science and technology across time.

The museum foresees collaboration in the domestic, regional and international levels toward excellent institution

Close collaboration with neighboring universities, especially with UPI is planned. Some of collections including from Bosscha Observatory are planned to be replicated and put in the museum, for the benefit of wider audience.

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[2] Hidayat, B., Malasan, H.L, and Mumpuni, Sungging 2016 *The History of Astronomy and Astrophysics in Indonesia*, in "The Emerging Astrophysics in Asia: Opening a New Window on the Universe", T. Nakamura & W. Orchistron (eds.), Springer, New York.

[3] Universitas Pendidikan Indonesia 2015, Museum Pendidikan, Bandung (*in Indonesia*)

[4] Government Regulation No 19 in 1995 of the Republic of Indonesia entitles "Indonesian Museum Guidance" (*in Indonesian*)