

Towards a Global Baseline for Astronomy Development

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Key Words

Global astronomy survey
Astronomy development

Summary

Astronomy is a field that has captured the minds of human beings for as long as we have been on the planet. Called by various names, the greatest strength that astronomy brings to just about every culture is the innate ability to stimulate curiosity. As a tool for inspiring minds about the wonders of science, there are few fields that are as accessible or familiar. However, the fact that astronomy is part of so many cultures does not necessarily translate into curious minds.

Introduction

In many developing countries there is a traditional or cultural awareness of the skies but general scientific astronomical knowledge amongst the public is low. This lack of scientific knowledge could be a result of poor media attention and a lack of education in the field. Without public understanding or astronomy-literate students, the situation translates into a lack of professional skill in the area of astronomy related sciences. When talking about the development of a field — in this case, astronomy — one has to consider development amongst all these target groups.

The Global Astronomy Survey (GAS)¹, conducted as part the Developing Astronomy Globally (DAG) Cornerstone project and carried out across developing countries, serves as a means of identifying a country's strengths and weaknesses, a basis on which to develop improvement plans, and a baseline with which to measure change.

Aims

I. To obtain a baseline, i.e. to know what each country has already achieved, what it is presently capable of, given its resources, and what its ambitions are.

II. To provide a basis for the creation of regional structures that will allow astronomy activities to be co-ordinated regionally.

III. To allow more effective planning of activities and projects that would help in the development of astronomy at all levels in a country.

IV. To measure improvement in the level of astronomy related activities over time.

Overview

The survey allows a country to self-evaluate and give itself a status in each of the following areas:

- Professional (Research) Astronomy: This will assess tertiary education, research training and research infrastructure in order to address professional astronomy research capacity within the country.
- Public Understanding of Astronomy: This will assess the level of activities and events that stimulate an interest in astronomy among the general public.

- Astronomy in Schools: This will assess primary and secondary education. It will address astronomy in the classroom and gauge the exposure to mathematics and science amongst young people.

The status of a country is classified according to four "phases" of development:

- Phase 1 countries would be *well established* countries with links to the International Astronomical Union (IAU) and functioning astronomy research and outreach communities.
- Phase 2 countries would have existing astronomy research and outreach communities but remain *in need of support* in order to get astronomy well established.
- Phase 3 countries would have a non-existent astronomy community but show *strong potential* in the form of physics or mathematics research and outreach communities who are willing to drive the development of astronomy.
- Phase 4 countries would have a non-existent astronomy community and would have *limited potential* for the development of such a community, i.e. no research or outreach communities.

Table 1. Recommended development plan based on phase overviews.

	Phase 1 countries (Well established)	Phase 2 countries (In need of support)	Phase 3 countries (Non-existent with strong potential)	Phase 4 countries (Non-existent with limited potential)
Professional development	– Use as regional hub	– Link with IAU network – Student/researcher exchange programmes co-ordinated by regional hubs	– Provide guidance on student and research opportunities internationally (with clause to return to home country) – Combine with IAU Commission 46’s TAD/ISYA/WWDA programmes	– High-level discussions with government department of Science and Education – Explore astronomy status in neighbouring countries and likelihood of collaborations
Development of public understanding of astronomy	– Use as regional hub	– Provide training for local “champions” – Feed public info and stories to champions regularly – Link with relevant Cornerstones (e.g. 100 Hours)	– Training workshop on Communicating Astronomy to the Public (involve IAU Commission 46) – Link with activities of region – Provide resources for public outreach	– High level discussions with government departments of Science and Education – Explore astronomy status in neighbouring countries and likelihood of collaborations
School-level education and development	– Use as regional hub	– Provide training for local “champions” – Provide education resources and networks (link with Galileo Teacher Training and UNAWE Cornerstone-projects for IYA)	– Training workshops on “astronomy in the classroom” – Link with activities of region – Provide educational resources – Introduction of astronomy into the school curriculum	– High level discussions with government departments of Science and Education – Explore astronomy status in neighbouring countries and likelihood of collaborations

So, the higher the phase number, the more a country is “in need” of assistance.

The survey is used to plan education and public outreach activities more effectively by structuring the overall plan in line with the phase overviews as shown in Table 1.

Progress

Forty complete country surveys have been received, as of mid-IYA2009. Geographically, the response is given in Figure 1.



Figure 1. Survey response geographical distribution. Light coloured markers show eight countries that have submitted incomplete or unapproved surveys. Credit: DAG/IYA2009/Google Maps

The classification of professional, public and school development into phases is shown in Figures 2, 3 and 4.

Considerations

The GAS is an insider’s view of the level of astronomy in three key areas and as such it contains answers that are factual, but may be incomplete and possibly represent the opinions of only a small group within a country. The survey is completed by the Single Point of Contact (SPoC) for

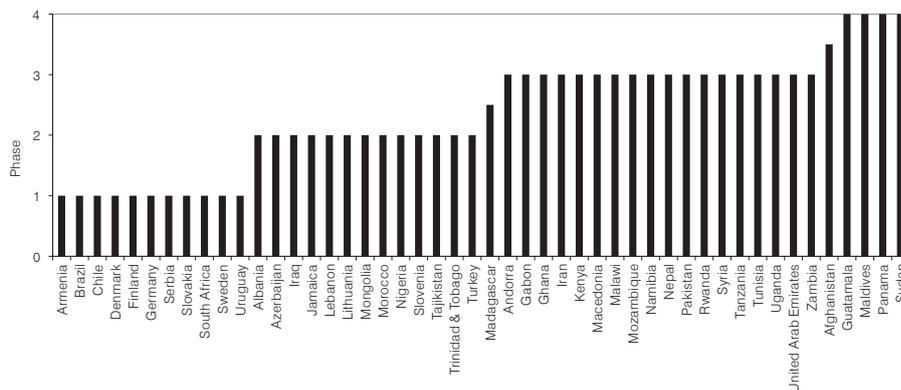


Figure 2. Ranked phases in the area of Professional (Research) Astronomy. Credit: DAG/IYA2009

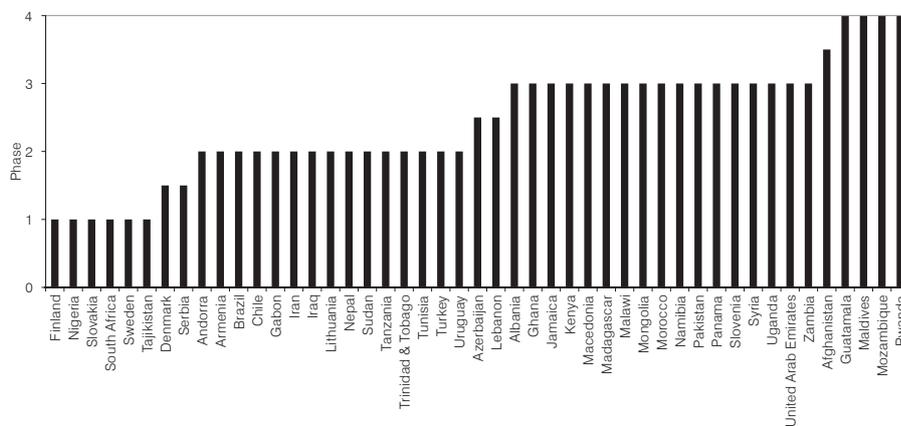


Figure 3. Ranked phases in the area of Public Understanding of Astronomy. Credit: DAG/IYA2009

the International Year of Astronomy 2009 in each country. The SPoC are individuals who have volunteered to be a first point of contact for the International Year of Astronomy in their countries. Although a delegated individual could also assist with the survey, it is the SPoC who is ultimately responsible for content.

Phases of development are based on the detailed answers given in the three areas and are therefore qualitative summary indices that allow a quick global overview. Planning of development activities is based on the details given for the three areas surveyed.

Since DAG focuses on countries in need, an important consideration is what is meant by a developing country. The Human Development Index (HDI) is an index used by the United Nations Development Programme (UNDP) to rank countries by the level of human development². With due regard to criticisms, this may also be used as a means to categorise countries into developed, developing or underdeveloped. A HDI of 0.8 or more is considered to represent high development. A HDI below 0.5 is considered to represent low development. Figures 5, 6 and 7 provide a comparison of phases with HDI³. These figures show that it is incorrect to dismiss astronomy development activities in countries that are regarded by the HDI as developed, i.e. developed countries can also show a need for astronomy development. The power of the survey is that it reveals the need for astronomy development, but the route taken to address these needs will depend on the specific country's level of development i.e. the educational, political, and funding structures in place within it.

Improvement

Country surveys do have room for improvement and there is a slow stream of amendments to the existing surveys from independent individuals (other than the SPoC) who are involved in astronomy in that country. According to the survey process, only the SPoC for the country has the authority to approve changes to the official survey. However, it is important to record comments or amendments as they arise in order for country surveys to achieve a more reviewed and objective state. Also, as facts may change over time (e.g., information about the number of astronomy graduates will increase) this information needs to be updated, allowing both a current view of a country's status and a historical view of change.

With this in mind the repository for the GAS has been changed to a multilingual and dynamic Content Management System

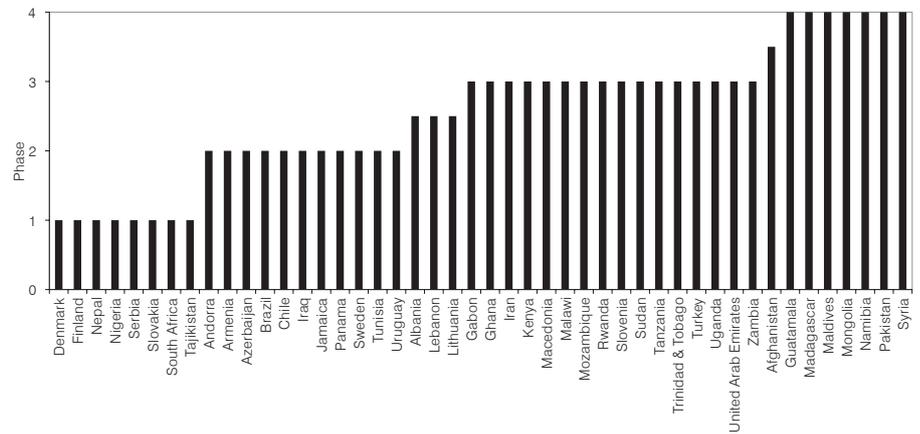


Figure 4. Ranked phases in the area of Astronomy in Schools. Credit: DAG/IYA2009

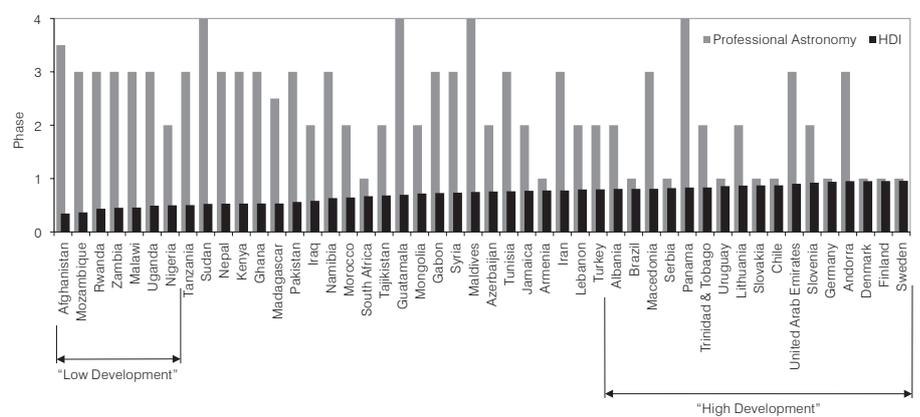


Figure 5. A comparison between Professional (Research) Astronomy and HDI. Credit: DAG/IYA2009

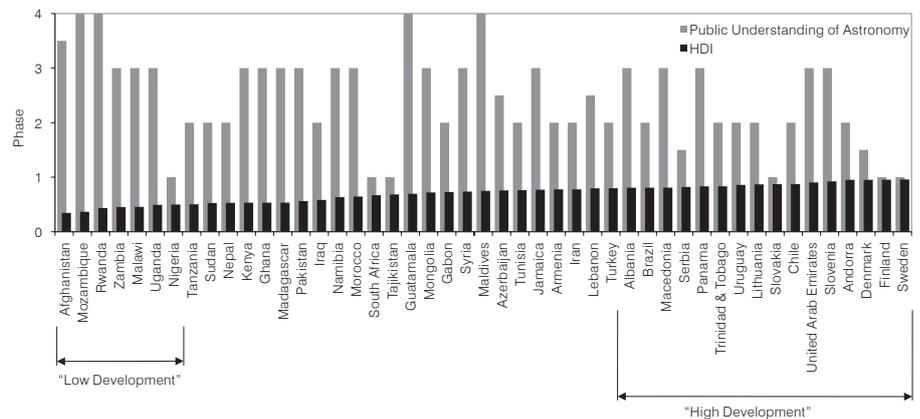


Figure 6. A comparison between Public Understanding of Astronomy and HDI. Credit: DAG/IYA2009

(CMS) based website able to register and record objections, amendments, corrections, changes by any individual and to allow these to be approved by the SPoC for the country. Ownership of these surveys is essentially handed over to the participating countries. This will allow the GAS to progress towards a more transparent, reviewed and accurate representation of

astronomy in these countries and ensure sustainability of the DAG initiative beyond IYA2009.

Recommended usage

- I. People involved in astronomy are encouraged to read through surveys for their, and neighbouring, countries and

to try to collaborate with each other on: astronomy related projects at university, public and school levels; travelling academics; sharing of equipment; sharing of knowledge and expertise; sharing of educational curricula.

II. Organisations involved in global education and public outreach activities can use the surveys to plan their initiatives more effectively by structuring their overall plan in line with the phase overviews as shown in Table 1.

III. The IAU can use such data to inform future astronomy development projects.

IV. Funders and sponsors of equipment could use this survey to identify where to target their astronomy development efforts.

V. Regional structures could be established from this information such that any efforts within a region are optimised to benefit neighbouring countries.

Conclusion

The Global Astronomy Survey is a “first stop” repository for any individual or organisation interested in astronomy development information for specific countries. It provides a valuable starting point from which to plan development activities.

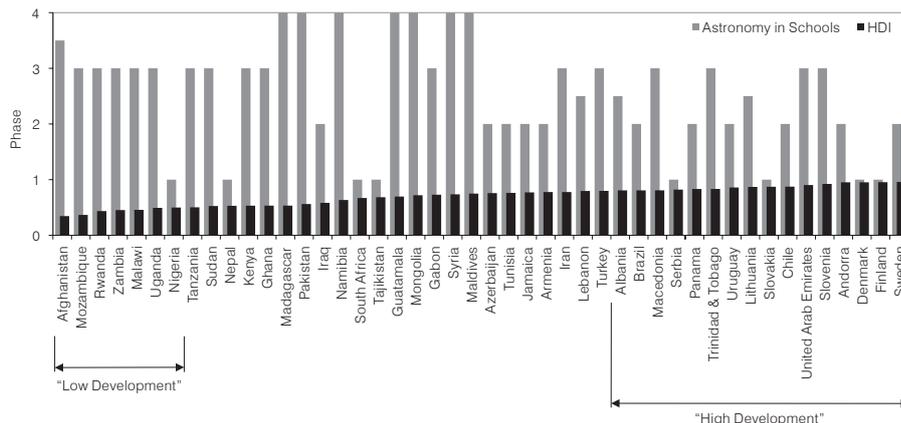


Figure 7. A comparison between Astronomy in Schools and HDI. Credit: DAG/IYA2009

The survey will serve as a sustainable project of the DAG Cornerstone project, beyond IYA2009, hopefully contributing to astronomy development initiatives over the long term and in a meaningful way.

Notes

- <http://www.developingastronomy.org/index.php/survey>
- Human Development Indices: A statistical update 2008*, United Nations Development Programme, 2008, New York.
- UNDP HDI 2006 data is used for all countries except Andorra (data unavailable – average of neighbouring country data assumed) and Afghanistan Human Development Report 2007, Center for Policy and Human Development, 2007, Pakistan.

Biographies

Lolan Naicker has an educational background in engineering and in physics. He is a registered Chartered Engineer (Engineering Council United Kingdom) and is interested in interdisciplinary work across science and engineering fields. He is presently taking time out to contribute to education and public outreach initiatives.

Kevin Govender is the manager of the Southern African Large Telescope Collateral Benefits Programme at the South African Astronomical Observatory and also chairs the Developing Astronomy Globally Cornerstone project.



Europlanet Prize and Funding Scheme

EUROPLANET RI invites nominations for The Europlanet Prize for Excellence in Public Communication in Planetary Science. Europlanet is launching an annual prize of 4000 Euros to recognise and honour outstanding communication of planetary science to the general public by an individual or an institution. Europlanet’s Funding Opportunity for Outreach activities in Planetary Science. Up to 15 000 Euros funding is available to help develop innovative projects to engage the general public across Europe with planetary science.

Closing date for Prize nominations and funding applications is 11 January 2010.

More information: <http://www.europlanet-eu.org>

Colloquium: Future Professional Communication in Astronomy II

An open forum to discuss the state and evolution of professional communicating in astronomy.

15–16 April 2010, Harvard–Smithsonian Center for Astrophysics, USA

More information: <http://conf.adsabs.harvard.edu/FPCA2/>