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Africa in Space: Legal Issues and Responsibilities Related to Space Technology Development Programmes

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1. INTRODUCTION

Outer Space has always fascinated man, beginning from the Biblical days of the building of the Tower of Babel to this very Century in which it is particularly important in his everyday life. So, man has been making attempt to explore, he has explored and he is still exploring this important domain. This will remain so even to the end the days of the last man on Earth.

- The early vision of space leaders, particularly the U.S and Soviet Union, was space for prestige and supremacy.

- That vision was not different from that of the people of Babel:

  "Come, let us build ourselves ... a tower whose top is in the heavens. Let us make a name for ourselves …" (Genesis 11

- The beginning of Space exploration was characterized by "State-selfishness" and unfriendly-race.
- Soviet Union made several achievements first:
  - launched Sputnik I in October 1957
  - Cosmonaut Yuri Gagarin of Soviet Union became the first human being in space on April 12, 1961

- Soviet Union leadership claimed that its first capabilities were evidence of its overall superiority

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- These first-in-all achievements contributed to significant increase in Soviet Union national prestige vi-a-viz the U.S

- Kennedy and his advisers felt the need a to beat Soviet Union, to re-establish U.S prestige and demonstrate its leadership.

- So they came up with an ambitious plan to land a man on the Moon.
- President Kennedy in 1961 wrote a Memo to his VP

In his address at Rice University on the Nation's Space Effort on 12 September, 1962, President J.F Kennedy gave the reason for choosing to go to the Moon:

Not because going to the Moon is easy, but because it is hard, and it is one which America intend to win.

The success of the Apollo project, which unilaterally demonstrated U.S Space leadership, put an end to the rivalry and unfriendly competition between the two giants.

- U.S, under Ronald Reagan in 1984, shifted its approach to Space exploration from the competitive strategy towards a more cooperative strategy

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The construction of a permanent manned space station

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ISS

- At this point, it has been realized that the activities in outer space provide wealth of benefits, & go far beyond supremacy & might
- These made other countries of the world, including Africans, to join in space exploration and exploitation
- Today, there are about 1071 operational satellites in orbit
- Africa has about 24 both operational and non-functional satellites.

2. SPACE PROGRAMMES IN AFRICA

- Africa realized that space sector plays an increasingly pivotal role in the efficient functioning of modern societies and economic development.
- Discovered that the use of satellite technology in navigation, communications, meteorology, and earth observation can help in:

transport, natural resources management, agriculture, environmental and climate change monitoring, entertainment and so on.

- **Some countries in Africa now delve into space sphere:**
  - Nigeria established its space Agency (NASRDA) in 1999
  - South Africa established its space agency (SANSA) in 2010
  - Algeria established the Algerian Space Agency (ASAL) in 2002
  - Egypt's Council of Ministers approved on 27 September 2017 the establishment of a space agency
  - Kenya established its space agency, Kenya Space Agency, on 24th February 2017
  - Ghana established its Space Science and Technology Centre in 2012

Africans were able to join the race for space for the following reasons:

- There was improvement in satellite and launch technologies
- This improvement made satellites smaller, faster, better & cheaper
- International encouragement of cooperation in space projects
- Widespread of cheap and affordable satellite data

Some countries in Africa and many other private companies all over the world became active players in space

- Some countries in Africa took advantages of them:

  - Nigeria
  - South Africa
  - Algeria
  - Egypt, and
  - Ghana

NIGERIA 

- NIGCOMSAT 1R December 19, 2011
- NIGERIASAT X August 17, 2011
- NIGERIASAT 2 August 17, 2011
- NIGCOMSAT 1 May 13, 2007
- NIGERIASAT 1 September 27, 2003

SOUTH AFRICA

- NSIGHT-1 November 20, 1998
- ZA-AEROSAT November 20, 1998
- KONDOR E December 19, 2014
- ZACUBE November 21, 2013
- SUMBANDILA September 17, 2009
- SUNSAT February 23, 1999

ALGERIA

- ALSAT 1N September 26, 2016
- ALSAT 2B September 26, 2016
- ALSAT 1B September 26, 2016
- ALSAT 2A July 12, 2010
- ALSAT 1 November 28, 2002

EGYPT

- EGYPTSAT 2 April 16, 2014
- NILESAT 201 August 4, 2010
- EGYPTSAT 1 April 17, 2007
- NILESAT 102 August 17, 2000
- NILESAT April 28, 1998

Ghana

- GhanaSat-1 July 7 2017

MOROCCO

- MOHAMMED VI-A November 8, 2017

- These countries lack the complete technical know-how to participate independently in space-related activities.
- Focus on Earth Observation
- Now included communication satellites

African countries have their activities limited to the use of space data for socio-economic development

- Uganda
- Sudan
- Ethiopia
- Burkina Faso
- Senegal
- Angola
- Kenya
- Niger
- Libya
- Zaire

3. **LEGAL ISSUES IN SPACE TECHNOLOGY DEVELOPMENT PROGRAMMES**

- Need for formulation of new international rules and regulations for the conduct of activities, as the new frontier was outside the bounds of existing international law.
- Onus fell on the UN to –
- "maintain international peace and security" (Article 1 United Nations Charter, 1945) and, to encourage 'the progressive development of international law and its codification" {Article 13 (1) (a)}.
- It became the focal point for international cooperation in outer space and for the development of international space law

➢ Today, UN-COPUOS has developed a broad body of international space law

➢ Guided by the principle of consensus in its decisions, COPUOS drafted significant international agreements between 1967 and 1979:

a. the Outer Space Treaty (1967);

b. the Rescue Agreement (1968);

c. the Liability Convention (1972);

d. the Registration Convention (1975); and

e. the Moon Agreement (1979).

➢ These five treaties form current space law regime

- In discussing the topic at hand, the under-listed issues are relevant. Some of these issues are covered by the treaties, while others are covered by other instruments

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- **Registration**
- **Licensing**
- **Responsibility or Liability**
- **Radio frequencies use**
- **Orbital debris**
- **Mineral Exploitation**

Registration

- The Registration Convention makes the registration of objects launched into outer space mandatory **(Art II, Registration Convention)**
  - Whether launched by a State, private entity or nationals of States
  - This must be done with the United Nations Secretary-General **(Art III, Registration Convention)**
  - Each launching state shall maintain appropriate registry **(Art II, Registration Convention)**

Licensing

- States are the principal actors in the int'l legal system (**Int'l Law**)
- Int'l space law gives States the freedom to explore & use outer space (**Article I, OST**)
- This freedom can be transferred to nationals of the States and non-governmental entities operating within each state

- Int'l space law gives States power to "control" other actors in space, and holds them internationally "responsible" for their activities (Art VI, OST)
- States must ensure conformity with the provisions of this law
- States have the power to "authorize" and "continue to supervise" the activities of space actors within (Art VI, OST)

- In carrying out their responsibilities under the law:

States must issue licenses to all entities carrying out space activities within their territories = Authorization

- **Therefore, it is important for each State to have licensing regime (National Space Legislation)**
  - NASRDA Act 2010
  - South African Space Affairs Act 1993

Responsibility or Liability

- States shall bear international responsibility for national activities (governmental, non-governmental or nationals) in outer space (Article VI OST;
- States shall give authorization and continuing supervision for activities of non-governmental entities in outer space

- States must assure that national activities are carried out in conformity with the law
- When activities are carried on by int'l organization = responsibility for compliance is borne by the int'l organization and State
  - Int'l law recognizes int'l organizations as important actors in int'l relations

- State party to the treaty is internationally liable in case of damage (Art. VII OST)
  - Only States are held liable NOT individuals = National Space Legislations are important
- Launching State shall be absolutely liable to pay compensation for damage caused by its space object (Art. II Liability Convention)
- Liability by a launching state at "fault" (Art. III Liability Conv)
  - How do you establish "fault" in situation where you do not have high-tech surveillance equipment to detect such fault?

Radio Frequency Use

- Radio frequencies are managed on an international level by ITU
- Radio frequencies are finite natural resource to be used by all countries on equitable basis
- ITU is tasked with ensuring the rational, equitable, efficient, and economical use of the radio frequency spectrum
- Applicable sources of law for radio frequencies are the ITU Constitution, the ITU Convention, and the ITU Radio Regulations

- The obligation of every State under these laws is to:
  - allow its small satellite operators only to use radio frequencies as allocated under the Radio Regulations
  - prevent them from causing harmful interference to the radio services of others,
  - require them to operate their satellites in accordance with the ITU Radio Regulations, and
  - require them to obtain licenses from the designated governmental agency.

Orbital Debris

Orbital debris poses a risk to continued reliable use of space-based services and operations and to the safety of persons and property in space and on Earth.

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U.S. National Space Policy, 2006.

- Huge increase in the number of space players in the past few decades has made outer space congested and hostile to both man and space objects

- Millions of space debris fragment orbits the Earth (some of which are carrying radioactive substance) posing threat to space assets, humans and environment.
  - Iridium 33 and Cosmos 2251 Collision (2009)
  - COSMOS 954 Re-entry (1978)
  - Chinese Fengyun 1 C satellite and Russian Laser-ranging retro-reflector collision (2013)
  - A portions of Skylab came down over Australia (1979)
  - A 7-foot strip of metal from a Soviet rocket landed in Lakeport, California (1987)
- Accidents & intentional destructive events, & launch failures, produce large quantity of debris
  - U.S and Soviet Union ASATs (Between 1968 and 1985)
  - Chinese ASAT (11 January 2007)

Cascade Effect (Kessler Syndrome)

- Even if no further space launches take place, the space debris population will continue to increase, resulting in a continuously growing collision rate

- Concern for the dangers of space debris and the security of valuable space objects and humans, has brought about efforts to mitigate the generation, at both national & international levels

  - Development of technically feasible and practical ways and means of decreasing or avoiding space debris.

Technical measures

- United States Government Orbital Debris Mitigation Standard Practices 2000
- U.S. Federal Communications Commission (FCC) rules 2004 (graveyard orbits 200 to 300 km above GEO)
- FCC rules in 2005 requiring satellite system operators to submit orbital debris mitigation plans.
- NASA Handbook for Limiting Orbital Debris 2008
- ESA Space Debris Mitigation Handbook 1999
- ESA Resolution for a European Policy on the Protection of the Space Environment from Debris 2000

- European Space Debris Safety and Mitigation Standard 2002
- Revised Space Debris Mitigation Handbook
- ESA debris mitigation guidelines in 2003
- IADC Space Debris Mitigation Guidelines 2002
- UNCOPUOS adapted ESA debris mitigation guidelines
- International Standard Organization (ISO) Standards
- European Code of Conduct for Space Debris Mitigation 2008

Challenges

- No specific treaty for space debris = the available ones are just being stretched
- Definition of space debris
- Guidelines have no legal force
- Guidelines must be implemented through national mechanism = What happens to countries without legal and regulatory mechanism?
- Some of the guidelines are not technically viable

Mineral Exploitation

- Slogan for the new space:

Get the useful mineral resources in the Moon, Asteroid and other space domains for our "benefits", and to solve near-future problems of scarcity

- The world has realized that there is just not enough mineral resources on Earth to go around

Peter Diamandis (2013)

Founder, Planetary Resources

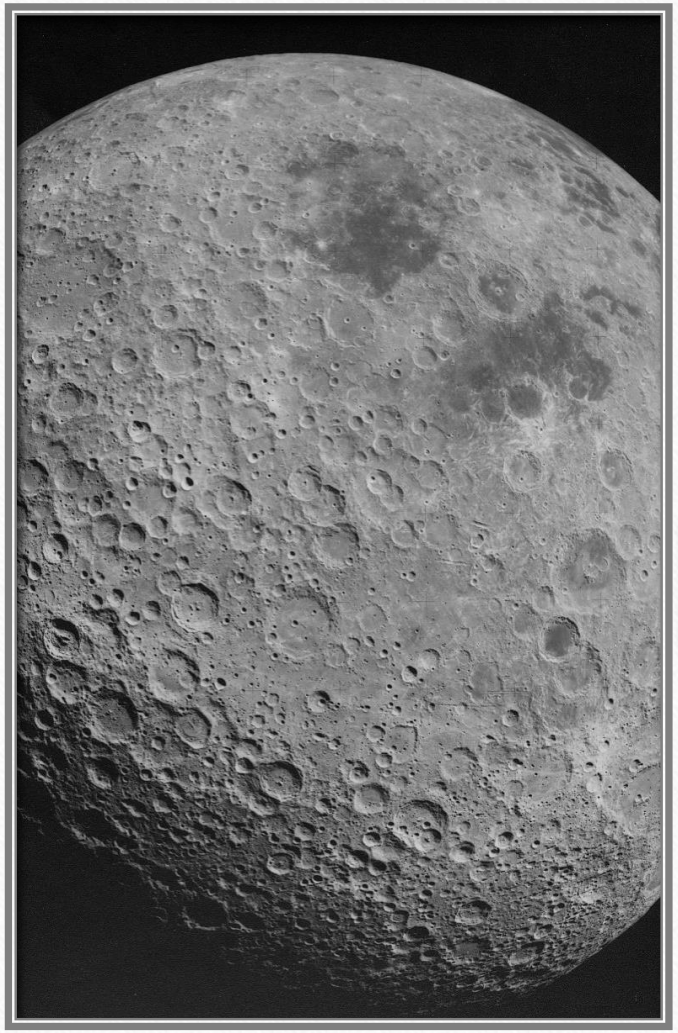
- "Everything we hold of value on this planet, metals, minerals, real estate, energy sources, fuel—the things we fight wars over—are literally in near infinite quantities in the solar system."

The Moon

Contain rare earth resources like:

- titanium
- uranium.
- helium-3 (can solve the world's energy demand for 10,000 years
- Plain-old mineral plagioclase – includes pink spinel, a prized jewel on Earth.

❖ This is worth several billions of dollars.



Asteroids

Asteroids contain enormous quantities of accessible resources like:

- iron, Nickel, magnesium,
- water, Oxygen, Iridium, Palladium,
- Gold, osmium, Tungsten, rhenium,
- Ruthenium, rhodium gold, Silver,
- Platinum, olivine , and pyroxene.

- The mineral wealth of the asteroids in the asteroid belt and the solar system is several billions of dollars.

- The mineral resources of outer space, if mined, would worth several trillions of dollars.
- Diamandis estimates an asteroid being tracked by Planetary Resources to worth a total sum of between $300 billion and $5 trillion
- More so, it has also been said that one single asteroid in our solar system - 241 Germania - has $95.8 (£60) trillion of mineral wealth inside it - nearly the same as the annual GDP of the entire WORLD

- Some 1999 experiments carried out by some scientists revealed that Uranus and Neptune contain methane (CH_4), which can dissociate to produce diamond at high pressures and temperatures.

- In the future, the mining of diamonds in these planets may bring revenue worth several billions of dollars.

- Governmental organizations
  - NASA
  - JAXA
  - CAS

- Private Companies
  - Planetary Resources Inc.
  - Deep Space Industries
  - Moon Express Inc.

- Current Issue

Nations have made it a hot topic of debate in their legislative drafting in the last few years.

National Legislations

- United States' Commercial Space Launch Competitiveness Act, 2015 – gives rights to its citizens, including commercial entities, to own resources extracted from space.
- Luxembourg's 11 November 2016 Draft law – ensures that private operators have rights to the resources they extract in outer space.

The citizens of these countries

"shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use and sell the asteroid resource or space resource", especially if "obtained in accordance with applicable law, including the international obligations"

To these Countries

The laws are perfectly in line with the OST, and does not suggest to either establish or imply in any way sovereignty over a territory or over a celestial body; rather it only addressed the appropriation of resources

Division among Experts on the Legality

- No right of States or individuals to appropriate any form of space resources.
- The general and encompassing wording of Article II of OST does not allow differentiating between outer space, including celestial bodies, and the natural resources thereof.
- There is right to own
- Depends on the type of mineral resources concerned.
- Extracted Mineral from space can be owned.
- The concept of res communis in the OST was accepted only to serve as a defence against sovereign appropriation of property

Fact from the two Arguments

- Prohibition of ownership of specific resources or even of commercial exploitation thereof has not been addressed by the OST, and essentially has not been conclusively settled at an international level.

1. Outer Space Treaty

- **Principles relevant to space mining enunciated :**
- exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and shall be the province of all mankind (Article I);
- outer space shall be free for exploration and use by all States (Article I); and
- outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means (Article II)

Fact about OST Provisions

- No Int'l agreement, whether the right of "free use" (in Article I) includes the right to extract and own minerals resources, and whether the phrase "not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means" (in Article II) includes a ban on the right to extract and own mineral.

2. The Moon Agreement

- Adopted to define and further develop many provisions of OST
- Provides that those bodies should be used exclusively for peaceful purposes
- That their environments should not be disrupted
- That the UN should be informed of the location and purpose of any station established on those bodies.
- Provides that the Moon and its natural resources are the CHM and
- That an international regime should be established to govern the exploitation of such resources when such exploitation is about to become feasible.
- See **Articles 11, 4 & 6**

Common Heritage of Mankind

Underdeveloped and developing states endorsed the common heritage of mankind principle because they fear economic benefits would accrue only to the wealthier nations

It aimed to establish a more equitable distribution of resources and income between developed and underdeveloped/developing states.

- In 2014, at the level of UNGA, Nigeria underscored the importance of equal and non-discriminatory access to outer space for all States that would aim at improving living conditions, regardless of a country's scientific, technological, and economic development, and stressing that Outer space was CHM.
- This position was often repeated during the three days debate

The Sad News

- The provisions of the Moon Agreement, no matter how beautiful and clearly stated they are, are only binding on the States that have so far ratified them.
- They are not binding on those States that have refused to; and
- Those that have refused to ratify the Agreement are majorly space-capable States, which the US is part.

4. NEED FOR NATIONAL SPACE POLICIES AND LAWS IN AFRICA

- National space policy & law are important tools in African space programs
- Int'l space law imposes a duty of authorization & continuing supervision of non-governmental space activities on all State parties.
- Authorization here means licensing
- Serious non-governmental space activities cannot take place in a State without sophisticated licensing and authorization regime.
  - South Africa and Nigeria have national space policy and law regime

5. WHAT IS EXPECTED OF AFRICA IN SPACE

- Blur all the crevices created by political and colonial attachments in Africa
- Look inward for solution to the continent's problems
- Develop and harmonize the space laws and policies of African countries
- Cooperate in most space projects
- Pull resources together towards achieving African-made space products = design, develop and launch

6. CONCLUSION

The idea of African Space Agency is a laudable one

Let us nurture it, feed it and make sure it grows = **Thou shall not kill the African Space Agency**

If we can't do it ourselves, no one will do it for us

It is not impossible for Africans to do it themselves

Let's lean on one another

LONG LIVE AFRICA IN SPACE!

THANK YOU FOR LISTENING

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