REASONS TO MINE ASTEROIDS

With the rapid progress made in technology, humans are taking huge steps in space today. There is huge potential in space, and particularly in asteroid mining.

ENERGY CRISIS

- Non-renewable fossil fuels like coal, oil currently account for 81% of the world’s primary energy.
- EARLIER, renewable energy could not compete with non-renewable sources because it relied on metals in short supply. Resources found on asteroids would solve this problem completely.

RARE EARTH METALS

- Many of the metals widely used in almost all industrial products were always limited and are now in SHORT SUPPLY leading to skyrocketing manufacturing costs.
- These include Platinum Group Metals (PMGS) and others like gold, cobalt, iron, molybdenum etc.
PROJECTED SCARCITY OF RESOURCES ON EARTH

Resources

Economically accessible minerals drawing to a close this century

Pre-recession (2000-2008) Global NNR Scarcity Summary

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Image Credit-Shackleton Energy Company

THE NEED FOR WATER

1. **SUPPORT SYSTEM FOR ASTRONAUTS** - Since the main constituents of water are hydrogen and oxygen, it is a source of oxygen for life support.

2. **PROTECTION FROM RADIATION** - Water absorbs and blocks infrared radiation, which means that by storing heat it helps to maintain temperature.

3. **ROCKET FUEL** - Rocket propellant is hydrogen and oxygen based, with a large percentage of the weight of a spacecraft taken up by fuel.

4. **SPACE EXPLORATION - A GAS STATION IN SPACE**
   - Today billions of dollars are spent in rocket fuel to sustain space explorations.
   - If, water is taken from asteroids and broken down into fuel, rockets will become lighter and missions cheaper.
   - Asteroids will serve as **ORBITAL REFUELLING DEPOTS** which will allow us to make journeys that have always been out of our reach.

**THE RELATIONSHIP SUMMARISED:**
- Huge cost of rocket fuel substituted by orbital refuelling
- Lighter rockets
- Cheaper missions
- Key to space exploration
- Blocks radiation
- Hydration and oxygen to astronauts
Earth vs. Space- Accessible Water

- The Volume of the Earth’s accessible water compared to the volume of the world

Image Credit: USGS Water Science School
Water as the future of Space Exploration

HOW ASTEROID MINING CAN BE DONE

ON-SITE: A robot prospector drills out precious materials to be launched back to Earth in capsules.

HOW COULD IT BE DONE?
NASA and space advocates have studied various plans to extract space resources since the 1970s.

BAG IT: A proposed retrieval mission would enclose an asteroid up to 23 feet in diameter (7 meters) for transport to the moon’s orbit.

TOW TRUCK: An asteroid is hauled into Earth orbit by rocket power.

CREDIT: TOP, NASA/AMES (DENISE WATT); MIDDLE: DSI (BRYAN VERSFELD); BOTTOM, NASA/KECK (RI STERNBACK)
EXISTING INTERNATIONAL & DOMESTIC LEGISLATION

INTERNATIONAL:

NATIONAL/DOMESTIC LEGISLATION
2. *USA* – Space Act 2015

USD 1 Billion - Cost of bringing 2oz of an Asteroid, the weight of a tennis ball back to earth

Major Private Companies engaged in Asteroid Mining:
- Planetary Resources
- Deep Space Industries
- Shakleton Energy Company
- Moon Express
THE NEED FOR A NEW LEGAL REGIME

- The Outer Space Treaty (1967) lays down the principles that apply to all activities carried out in space.
- **Province of Mankind Principle**—Article 1 states that the exploration of celestial bodies shall be for the benefit of all countries.
- **Non-Appropriation Principle**—Article 2 states that celestial bodies shall not be subject to national appropriation by occupation or any other means.

QUESTIONS WE FACE TODAY

- Can the UN provide a successful way to discuss space mining?
- Will countries enact legislations which is parallel to the law adopted in USA?
- Drawbacks of the OUTER SPACE TREATY
- Will countries ratify the Moon Agreement?

REASONS FOR ESTABLISHMENT FOR A NEW LEGAL FRAMEWORK

- **States No Longer Sole Participants In Space Activities**—Earlier, most space activities were undertaken by State governments. This is not the case anymore.
- **Regulation Of Private Parties**—With rapid technological progress and the entrance of private companies who wish to exploit the resources found on asteroids, there is a need to regulate their activities in an orderly manner to prevent conflict.
- **Regulation Of Joint Ventures**—For establishment of the framework for joint ventures between Governments and private entities
- **Dispute Resolution**—For settlement of disputes between States and Private entities and between private entities inter se.

THE FOLLOWING QUESTIONS CAN ONLY BE ANSWERED THROUGH PLANNING AND REGULATION:

1. What will the **sale price of mined resources** be? What is the extent to which profits will be permitted?
2. The **effect of asteroid mining** on the respective State and world economy
3. The **aim of the Government** in engaging in asteroid mining—For PROFIT or for STATE WELFARE?
THE INTERNATIONAL SPACE BODY (‘ISB’)  

**STEP 1- INTERNATIONAL COURT OF JUSTICE**— First, the ICJ must be asked to determine what legal framework, IF ANY, will apply to SPACE RESOURCE UTILIZATION

**STEP 2- Proposal**— Formation of a new international body, (‘ISB’) which will have a status of a specialized Agency under the United Nations. The ISB will consist of a Panel of Experts appointed by All Member States.

**Objective**— Formulation of rules by the Panel of Experts that apply to the entire range of Asteroid Mining activities.

**PROCESS FOR GRANTING A TENDER FOR MINING**

**STEP 1- APPLICATION STAGE**
State Governments and Private Parties, either in partnership or separately apply via tenders

**STEP 2- GRANT OF LICENSES**
After due consideration, the Expert Panel will grant a mining license to the most capable enterprise

**STEP 3- FACTORS TO BE CONSIDERED BY PANEL**
The Expert Panel is duty-bound to consider the strength of the tender based on the applicant’s mining plan, financial resources and track record.

**FUNCTIONS OF THE ISB**

- Approving Target Asteroid
- Terms of Mining - Duration, location, rights of licensee, 3rd parties
- Issue and Revocation of Mining Licenses
- Apportion Liability
- Dispute Settlement
- Determining property rights of Licensee

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**STRUCTURE OF THE ISB**

- INTERNATIONAL SPACE BODY
  - All nations States members
- EXPERTS
  - Appointed by ISB members
- PANEL OF EXPERTS
DISPUTE SETTLEMENT

**STEP 1- Dispute Resolution by the ISB**
Expert Panel that constitutes ISB decides disputes between parties.
The **ISB DECISION IS BINDING**.

**STEP 2- The Multi-Door Courthouse**
However, in the interests of justice and fair play, an appeal to a duly authorized adjudicatory body will be permitted.
Departing from the traditional system, this appeal will lie to a **MULTI-DOOR COURTHOUSE**.

**WHAT A MULTI DOOR COURTHOUSE IS:**
- A courthouse where various dispute resolution options exist
- The dispute resolution options include mediation, arbitration, conciliation, case evaluation and finally adjudication
- Parties are referred to different dispute resolution options to select an option that suits them best.
- **GOAL OF THE SYSTEM-** Streamlining the dispute resolution process and resolving disputes beyond the standard option of litigation

An Illustration of a Working Multi-Door Courthouse