

## EXPLORERS, MERCHANTS AND ENVOYS OF MANKIND

or about national interests in development of  
international legal regime for space exploration

**Jakub Ryzenko**

Polish Space Office

&

Institute of International Relations,

Warsaw University, Poland

**ryzenko@onet.pl**

*The paper presents wide scope of legal challenges that may arise during early phases of space exploration. Its purpose is to identify interests of states that may emerge and to analyse their influence on development of legal regime required for exploration activities. Proper understanding of motivations of all parties involved is of highest importance to ensure political feasibility of legal regulations that are to be developed.*

*General direction of possible legal solutions is presented basing on applicability of concepts developed in other domains of international law.*

### LEGAL CHALLENGES OF SPACE EXPLORATION

Discussing national interests involved in development of legal regime for space exploration, it is appropriate to start from analysis of legal challenges the exploration will create.

This analysis do not cover some general issues like liability or development of general legal environment for commercialisation of space and instead focuses on challenges directly created by extensive operations beyond low earth orbit. Furthermore no potential military-related interests and motivations are analysed. Finally the discussion assumes that the political motivation to continue space exploration will remain in place, so the long-term phenomena may become apparent.

#### ***Moon***

The concept of in-situ resource utilisation is currently heavily discussed as the most cost-effective mode for prolonged operations

on the surface of the Moon, limiting the number of logistic flights from Earth. There is a significant difference between use of lunar regolith, which is abundant, and use of ice, potentially existing in permanently-shadowed craters in polar regions – the latter may be a very limited resource.

Countries conducting activities in the first wave of exploration will want to use the ice to the extent possible as this will significantly decrease the logistic costs of their operations. But other countries – players that will appear on the stage in future – would also want to be able to utilise this resource in their prospective operations. And no one can be sure there will be enough of it for all, particularly if long periods of utilisation are considered.

It is certainly possible to argue that at the time late-comers appear on the scene, technologies will mature enough to provide other solutions, not based on most limited resources. As this may be true, it is however not certain that application of those

technologies will not represent high additional costs or if they will be available for less-advanced nations.

Furthermore craters with ice may represent the unique environment. It will certainly be analysed before and during the exploitation but creation of some areas reserved for future scientific needs seems to be a logical concept. Nevertheless, should the amount of ice be very limited, the concept of scientific reserves will compete against the need for immediate utilisation.

The additional dimension to discussion on right to use of limited resources will be added when and if the bases on the Moon, being much smaller gravity-well than Earth, are used to manufacture fuel for interplanetary travel. Is it appropriate to use ice from the Moon to fly to Mars at the expense of future local operations of prospective space-faring nations?

And one may imagine even more sensitive question. Assuming manufacturing of fuel from Moon resources is commercially viable for use in Earth-orbit (theoretically, difference in potential of both gravity-wells is favourable), how commercial interest should be weighted against future needs of currently not-present countries?

Governmentally-organized exploration activities may also blaze a trail for commercial ventures on the surface of the Moon. In general, surface as such can hardly be regarded as a limited resource (potentially apart from some very specific locations), but rules of its sharing and utilisation do not exist. Non-profit activities may easily defeat this kind of obstacle but would this be a case for commercial ventures? And it must also be remembered that certain business concept, like extensive use of Moon surface for generation of solar power that would be transferred to Earth, may be regarded as a long-term challenge for oil-exporting countries.

### *Mars*

Operations on the surface of Mars will certainly rise the issue of resources similar to that discussed in case of the Moon. Simultaneously however the potential presence of life creates additional challenges.

The most obvious and well-discussed is the need to follow certain planetary protection standards to minimise the risk of contamination and confusing life-searching activities, as well as danger of bringing back to Earth potentially hazardous organisms. In the early phase following of those standards will be costly but undisputable.

But if we do not find traces of life during first years of exploration and we will remain interested in conducting other operations, the new question will arise: Should the protection standards be kept, significantly increasing costs of the operations? Or should they be relieved creating the risk that in future, exploring other parts of the globe, we may find potentially interesting objects but will not be able to identify their origin? It is easy to imagine that different participating states may have very different policies in this field.

On the other hand, if living organisms are found on Mars, after a period of their extensive investigation a very different dilemma will arise: what is a proper balance between protection of existing life (Mars ecology) and needs to perform other activities in the cost-effective manner? And are single states or even groups of them entitled to take this kind of decisions?

Another interesting and related question, however being an issue of a much further future, results from the fact that at certain moment we may acquire capability to initiate changes (hopefully intentional and controlled) in Martian environment (theoretical concepts for terraforming are being already discussed). What kind of international mechanism should be developed for decisions of this magnitude?

Nevertheless there is a more practical, even if today still futuristic, version of this problem. When space-faring nations will be

motivated by improvement of efficiency of their operations and creation of favourable environment for potential growth of space business, the agenda of non-governmental non-profit actors may be very different. Already today we can observe a very active stance of organisations like Mars Society. As the costs of travel to Mars decrease (thanks to technology development being a result of governmental programs), it is reasonable to expect that their scope of activities may grow. Therefore the open question remains how universal the code of conduct for activities on the surface of Mars must be (non-profit actors may seek certification for their activities from nations other than space-faring leaders).

#### *Asteroids and small bodies*

Currently discussion on space exploration focuses mainly on Moon and Mars. Nevertheless prospects for scientific investigation and potential future utilisation of asteroids should not be omitted, particularly as in addition to all potential benefits mastering of those technologies may demonstrate itself invaluable for planetary defence applications.

Asteroids are probably the most cost-effective source of mineral resources from space that could be used on Earth or for constructions in orbit. And developments in the field of nuclear technologies may enable efficient access to those riches in relatively short perspective. But as there is only a limited number of objects in convenient orbits, they have to be regarded as limited resources in all aspects discussed in case of the Moon. Therefore the issue of interests of future space-faring nations arise again. Furthermore it must be remembered that a number of developing states is highly dependent on exporting rare minerals and their economic interests may be directly endangered by space-mining activities.

One of the most efficient ways to prepare utilisation of asteroid resources may be to redirect them into Earth orbit. As a result

two threats would be created. Firstly, all operations close to Earth may represent a risk of collision with our planet, which in case of larger bodies might be catastrophic. Secondly, presence of large mass in Earth orbit may create gravitational disturbances for orbits of artificial satellites and as a result activities of a single state (or a group of states) will influence the conditions for all space operations.

#### *Lagrange points*

The issue of space debris in low earth orbit is already widely discussed and relatively well-known. Current discussions on space exploration and potential utilisation of Lagrange points lead however to observation that environment of this special areas may also require particular attention.

Currently their utilisation for transit points for Earth-Moon and Earth-Solar System routes is foreseen, including presence of heavy objects, in some concepts even asteroids redirected from their orbits. At the same time however Lagrange points are pointed as unique locations for very precise astronomical instrumentation (e.g. terrestrial planet finder).

The question arises whether their utilisation as transfer points will represent an obstacle for astronomical observations (due to gravitational disturbances and possibly also presence of chemical engines' exhaust). If that may be the case, the extensive discussion may be needed whether the unique properties of at least one of these points should be protected and if so, by what kind of legal means.

### **BALANCING NATIONAL INTERESTS**

The attitude and interests towards space exploration divide states into three distinct groups with some subdivisions:

*Space-exploring nations* are active participants in exploration activities. It is possible to identify *leader(s)* – country(ies) that choose to develop capability sufficient

for independent operations beyond low earth orbit; and *followers* – states that choose to participate in international activities and do not have independent capability.

These countries will prefer to retain maximum possible freedom of activities and minimise legal restrictions, however they may seek establishment of certain standards. Furthermore, creation of the environment supportive for development of space business is one of their main goals, both as internal justification for space programs and as a mean to strengthen and enhance their capabilities in a long-term perspective.

*Emerging space powers and potential exploration players* have the capability (or may develop it in the foreseeable future) to actively participate in exploration activities, should they choose so. The difference is that emerging space powers already expect to be involved in exploration in a long-term future and consider this in their policies, when potential players currently do not plan this but do not close such an option and want to ensure their potential future interests are not endangered.

These countries will focus on preserving physical conditions necessary, and creation of legal environment supportive for efficient realisation of their own space programs in future (or should they choose so).

*Other states* will try to ensure that exploration activities will not endanger their earth interests and also may seek opportunities to benefit from exploration without being actively involved.

The cursory analysis of legal issue presented above permits for systematization of prospective challenges into three general categories:

#### *Codes of conduct*

The need to keep certain conditions of biological protection on the surface of Mars or to protect environment of Lagrange points represent category of issues that will require limitations in scope and character of permitted space activities. Establishment of

this kind of limitations, as enabling or supporting realisation of future goals, should lay in the interests of space-exploring nations and therefore reaching consensus on the content of standards and their approval by all involved players should be possible. The high level of internationalisation of the space community will probably be an additional factor supporting development of widely accepted rules.

On the other hand, in line with general tendency to preserve maximum freedom of future activities, legal forms that do not represent final and infinite commitment will probably be preferred, enabling their modification or even abandonment according to future policies of involved states. Furthermore it is reasonable to expect that as long as only one country (exploration leader) will be operating in particular area, it will prefer to define standards through its internal rules. This issue however should not represent a problem as long as those rules will be open for influence from the abovementioned international community.

The need to establish standards in more universal and binding form may arise if new players appear on the scene, whose willingness to obey rules voluntarily will not be evident (space business companies, non-profit organisations or even states with different priorities) or simply if number of involved players will grow significantly.

Interests of emerging and potential players should in general lay in line with those of the space-exploring nations. Therefore their actions may be expected only if no regime is established to protect areas or issues that are regarded as essential from the perspective of their long-term space ambitions.

As codes of conduct should not influence interests of other states, their actions are unlikely.

There is a wide scope of available mechanism that may be applied to create legal regimes without infinite binding power. The encouraging examples may be “soft”

regulations like inter-agencies standards developed for planetary protection or rules governing use of nuclear power sources established through UN General Assembly resolution. If the stronger legal instruments were required, it should be possible to seek binding agreements, but established for a limited time period – a kind of moratorium for certain type of activities, similar in form to mechanisms applied for armaments limitations.

### *Utilisation of resources*

As discussed above use of resources on Moon and Mars will represent for space-exploring states a considerable increase in efficiency of surface activities. Therefore these states will pursue a regime guaranteeing freedom of their utilisation. Furthermore, as successful development of space businesses is regarded as critical for their long-term prospects in space, they will try to avoid any general regulations that may limit or increase costs of future commercial activities.

The perspective of emerging and potential players may be very different. Depending on level of development of their national policies and foresight present in national administrations, ensuring their right to appropriate share of resources may become regarded as a vital interest. This attitude may be particularly strong in case of emerging space powers as utilisation of limited resources may be already foreseen in their early exploration concepts. On the other hand some of potential exploration players possessing developed space industry may regard their interests more linked to establishment of the most favourable environment for commercial activities.

There is no clear interest in pursuing similar rights to non-limited resources apart from the desire to create a universal regime; fact that unrestricted use of those might represent undesirable precedent; and risk that the question of certain resources being limited or not may arise in future.

Utilisation of space resources will not directly interfere with interests of majority of other states, however for some countries the problem may arise in a form of competition that space resources or energy could represent for their economies.

It is worth to emphasise that from practical perspective space-exploring nations can argue that the current regime for space is *res communis* as established by Outer Space Treaty and therefore interested states having sufficient technical capabilities might freely pursue their goals. The influence of all other states would have to be based mainly on a moral argument and would depend on the general international balance of power.

The Moon Treaty was developed in a bipolar world, when the relative strength of developing countries was artificially magnified and even then it was not accepted by majority of countries. To be effective the international legal order has to reflect the existing balance of power and in the current reality, particularly taking into account the most recent developments of international affairs, this is not a case.

To really establish the regime of “the heritage of all mankind” for outer space bodies, rights and obligations of exploiting states must be defined in more details and interests of space-exploring nations must be better balanced with those of developing countries. It is critical that the expectations of advocates of this regime are realistic. Otherwise the space-exploring states may simply be forced to abandon the establishment of the legal regime for space resources utilisation and through precedents the system well-known from the history where “first takes all” will develop itself.

The legal regime for Seabed resources utilisation had been developed in similar conditions and had faced similar problems. It is optimistic that it was possible to overcome the first wave of difficulties and to create, through certain corrections, a more universally accepted, market-compatible environment.

There is a number of mechanisms that may be applied to protect interests of future space-exploring players. Following the Seabed model, each time the exploitation of resources in certain area is planned, the second similar area may be reserved for use by future players. Trading mechanism developed for environmental treaties suggests that it might be possible to divide rights to shares of identified resources among all states and allow for their buying and selling, both between governments and in future potentially between governments and commercial companies. In yet another model, inspired by Antarctic regulations, part of identified resources may be reserved for future use, freezing rights of any states for future decisions. Similar solution may also be applied to protect certain areas through establishment of scientific reserves.

#### *Decisions in the domain of mankind*

Terraforming of Mars, protection of its ecology if it exists or even redirecting asteroids into earth orbit remain more distant challenges, nevertheless they are worth to be realised. The stand on accepting the right to take this kind of decisions unilaterally vs. seeking the approval of humanity will certainly depend on current and anticipated level on involvement in space exploration, but it will also reflect the attitude towards the role of international community and international law, foresight presented by administrations and some more general philosophical values of particular society.

Therefore, dissimilarly to previously discussed problems, alliances of states presenting similar positions will not necessarily reflect their stance towards space exploration. Nevertheless in general space-exploring states will probably tend to avoid any restrictions and base their activities on internal regulations, when potential exploration players will seek establishment of limitations and more universal decision-making mechanism.

As today the problem remains relatively distant, it is enough to stress the importance of free access to information on details of performed and planned exploration activities. In future in addition to attempts to create international consultation (if not decision-making) mechanisms, the need may arise to develop more sophisticated confidence-building measures, possibly with guaranteed access to information and even observatory status in case of some critical space activities.

#### *International cooperation*

All discussed issues encourage to emphasise the role and value of international cooperation.

Expanding the number of states involved in space exploration (even in limited scope) enlarges the international constituency that may expect long-term benefits from space activities, creates the feeling of "ownership" of space exploration and minimises the opposition.

Therefore it limits the risk that conflicts of interests, which will inevitably emerge, will evolve into more serious issues capable of undermining international stability.