

# Chapter 12

## Ethics for an Uninhabited Planet



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**Abstract** Some authors argue that we have a moral obligation to leave Mars the way it is, even if it does not harbour any life. This claim is usually based on an assumption that Mars has intrinsic value. The problem with this concept is that different authors use it differently. In this chapter, I investigate different ways in which an uninhabited Mars is said to have intrinsic value. First, I investigate whether the planet can have moral standing. I find that this is not a plausible assumption. I then investigate different combinations of objective value and end value. I find that there is no way we can know whether an uninhabited Mars has objective end value and even if it does, this does not seem to imply any moral obligations on us. I then investigate whether an uninhabited Mars can have subjective end value. I conclude that this is very plausible. I also investigate whether an uninhabited Mars can have objective instrumental value in relation to some other, non-Mars related end value. I find also this very plausible. It is also highly plausible, however, that spreading (human or other) life to a presently uninhabited Mars can also have subjective end value, as well as objective instrumental value. I mention shortly two ways of prioritising between these values: (1) The utilitarian method of counting the number of sentient beings who entertain each value and determining the strength of the values to them. (2) Finding a compromise that allows colonisation on parts of the planet while leaving other parts untouched. These methods should be seen as examples, not as an exhaustive list. Also, I do not take a definitive stand in favour of any of the two approaches, though it seems at least *prima facie* that the second approach may have a better chance of actually leading to a constructive result.

### 12.1 Introduction

Popular media report on an almost daily basis of someone's plans to put humans on, and eventually, colonise Mars (see, e.g. Bachman 2018; Beall 2018; Brueck 2018;

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Connor 2017; Eck 2018; Griffin 2017; Mack 2017; Solon 2018; Thompson 2018). The plans can originate from a host of different sources. They include national and regional space agencies such as the US space agency (NASA), the European space agency (ESA), or the Japanese (JAXA), Chinese (CNSA) or Indian (ISRO) space agencies, but they also include commercial initiatives such as SpaceX and Mars One. The timeline is probably rather long, but one thing to remember is that technological development and business decisions (in the case of the commercial initiatives) usually happen on a much shorter time scale than for example international treaties, not to mention ethical theory. It is therefore high time to start discussing the dos and don'ts of Mars colonisation while there is still time to influence the process.

Before we start colonising, or even visiting Mars, we need to do our best to find out if there is life or not (Persson 2014). Going to Mars will be challenging whether or not there is life, but the challenges will be of different kinds, from an ethical as well as from a practical perspective.

There is an ongoing debate about what kind of ethical duties it confers on us if there turns out to be life on Mars (see, e.g. Callicott 1992; Chon-Torres 2018; Cockell 2005, 2011a, b, 2016; Green 2014; Lupisella 1997, 2000, 2009; Marshall 1993; Persson 2012, 2013, 2014, 2017; Peters 2018; Race and Randolph 2002; Randolph and McKay 2014; Rolston 1986; Smith 2009, 2016)—but what if there is no life? Will there still be ethical restrictions for what we are allowed to do on Mars even if there is no indigenous life? As long as we do not know whether there is life on Mars or not, we have to be prepared for both eventualities, and for the different challenges they pose. I have previously argued that if we encounter extraterrestrial life, the ethical restrictions that imposes on us will vary depending on what kind of life we will be dealing with (Persson 2012). In this chapter, I will explore the following question: If Mars is uninhabited, do we have a moral obligation to keep it that way?

## 12.2 The Intrinsic Value of an Uninhabited Mars

A common basis for arguing that we should preserve Mars in its pristine state is that a lifeless Mars has *intrinsic value* and that this, in turn, confers a moral obligation on us keep it that way. It may be because it has intrinsic value *despite* being lifeless or that it has intrinsic value *because* it is lifeless.

In order to analyse this argument, we first have to take a closer look at what seems to be the crucial term here, namely 'intrinsic value'. What does that really mean? To most people who come across it, and seemingly to most people who use the term, it seems to just mean that something has a kind of value that is very important and that places moral duties on us. For a philosopher, this is not enough, however. We like to know what, if anything, makes it so important and what that, in turn, means in terms of moral duties.

A notorious problem with the term 'Intrinsic value' is that different authors use it in different ways, and sometimes in more than one way in the same line of reason-

ing. Some authors have, however, tried to figure out which different concepts hide behind the term, how these concepts relate to each other, and what are their moral implications (see, e.g. O'Neil 1997; O'Neill 1992; Persson 2008; Rabinowicz and Rønnow-Rasmussen 1999).

I have previously (Persson 2008) identified five common meanings of the term 'intrinsic value', three of which I think might be useful for our analysis:

1. Value as an end rather than as a means to something else (also called 'end value', 'final value' or 'non-instrumental value').
2. Value emanating from internal properties and not from external properties (also called 'inherent value').
3. Value emanating from the phenomenon itself independently of its relations to other phenomena (also called 'non-relational value').
4. Value that exists independently of any valuer (also called 'objective value').
5. The status something has when it is the object of moral duties, that is when moral agents according to some moral system have a duty to consider its interests (also called 'moral standing' or 'moral status').

Interpretations 2 and 3 can in some types of deliberations be very important but they are not of crucial importance in this investigation. The first, fourth and fifth interpretations are very important, however, since it is typically one or more of these that proponents of instrumental value for nonliving environments seem to be thinking about. The first and fourth interpretations are used for establishing moral duties in two steps: 1. Establishing the value. 2. Establishing how this value gives rise to moral duties. The fifth interpretation only needs one step since according to this interpretation, stating that an uninhabited Mars has 'intrinsic value' is just another way of saying that it endows us with moral duties. Let us, therefore, start from that end.

### 12.3 The Moral Standing of an Uninhabited Mars

If 'intrinsic value' just means the same as 'moral standing', we do not have to go through the first step and establish value in a real sense. Instead, we can approach the second step directly, and ask: How can we have moral duties to an uninhabited planet?

One author who argues that a nonliving Mars can have intrinsic value in this sense is Alan Marshall (1993). He does not explicitly distinguish between the different meanings of 'intrinsic value' though it seems that he is mostly talking about it in the sense we call moral standing. (In some passages, he seems to think about 'intrinsic value' more in the sense of objective value but we will get back to that later). One of his arguments for moral standing for planets and other nonliving objects builds on the successive extension of the realm of moral objects we have seen through human history from only including male members of the same community to also including women and people from other ethnic groups, to now also including animals.

According to Marshall, it is a natural development to continue this extension to also include plants, microbes and eventually abiotic objects (Marshall 1993).

This argument seems to be a positive version of what is often referred to as the fallacy of the slippery slope. Slippery slope arguments usually take the form ‘Do not do A unless we also have to do B, C and so on all the way to Z’. Marshall’s argument seems to take the form ‘Since we have done A, B and C we should also do D, E and so on all the way through Z’. That this is a fallacy is quite easy to see. That we have said A does not in itself force us to say B. What is needed to make the argument work is some kind of mechanism that makes it inevitable that if we take the first step we also have to take the next step. On a real slippery slope, it is the slipperiness in combination with gravity that makes this happen. Once we step out on the slope, we will inevitably—because of the slipperiness and gravitational pull—slide all the way down. In our case, we would need some kind of mechanism that forces us to continue to extend the realm of moral objects once we have started, and to do it at least until we have also included abiotic objects. Marshall has not suggested such a mechanism, however, and I cannot see what it would be. The fact that we have extended the realm of moral objects several times before is not in itself such a mechanism (therein lays the fallacy). Neither can it be used as an indication that there must be one. Each time we have extended the realm of moral objects in the past, we have had good reasons for that particular extension. If we are going to extend it again in the future, we will also need good reasons to make that particular extension.

In addition to his version of the slippery slope argument, Marshall (1993) does supply some independent reasons why we should attribute moral status to abiotic objects. One argument for why we should, according to Marshall, include whole planets in the realm of moral objects, is that the environments of these planets are not static. This means according to Marshall that these planets manage to live up to many definitions of ‘life’.

It is true that activeness in some sense does play a part in many attempts to define ‘life’. It would be a bit of a stretch to equate the geological and meteorological activity of Mars with the kind of activity one can find in living beings, but even if we grant that activity is activity and should be handled equally, it does still not give us what we need. For one thing, being active is never in any sense seen as sufficient for being alive. More important, however, being alive cannot be sufficient for having moral standing.

Moral standing is usually analysed in terms of interests. This means, in order to have moral standing, one has to have some kind of subjective perspective from which things can go better or worse (see, e.g. Bernstein 1998; Clark 1977; de Grazia 1996; Helm 2002; Jamieson 1998; Levine 1997; O’Neil 1997; Persson 2008, 2012; Regan 2001, 2004; Singer 2009, 2011). The ability to feel pleasure and pain is often set as a minimum criterion. The reason why the possession of interests is usually assumed to be necessary for moral standing is that it seems impossible to even make sense of the idea that we have moral obligations to something that does not have any interests of its own to consider. Is it for instance in the interest of a piece of granite to be revered where it stands or is it rather in its interest to be sculptured into a statue? If the granite

does not have its own perspective from which to judge this, then any judgement in the matter would have to come from the outside and we cannot reasonably claim that any duties regarding the piece of granite are duties to the granite.

When it comes to a lifeless Mars, it is very difficult indeed to imagine how a planet could have any subjective perspective to consider. One can, of course, imagine that in the future, or somewhere in another solar system, there is or will be machines that do not qualify as being alive but do have feelings. If that is or ever will be the case, I see no reason to deny these machines moral standing. This is not the situation we are talking about when it comes to present-day Mars, however. It, therefore, seems safe to say that the idea that we have moral duties to Mars as such, or to any specific lifeless object on Mars, cannot be correct.

This means that the fifth and most straightforward interpretation of ‘intrinsic value’ cannot be the interpretation we are looking for if we want to maintain that we have a moral obligation to preserve Mars in its pristine, lifeless, state. Maybe we will do better with the two-step approach of the first or fourth interpretations?

## 12.4 The Objective Value of an Uninhabited Mars

Attributing objective value to something, usually means that it has a value that is independent of whether anyone values it. There is a vivid ongoing discussion about whether values can be independent of a valuer and I will not attempt to give an overview of that discussion, or for that matter contribute to it. Instead, I will just for the sake of this analysis, assume that objective value is possible. Then, the questions will be: How do we know if an uninhabited Mars has objective value and if it does, can that endow any moral obligations on us to preserve it that way?

As mentioned in the previous section, Marshall (1993) does not just believe that a lifeless Mars has moral standing. He also claims that an uninhabited Mars can have intrinsic value in the fourth sense of ‘intrinsic value’, namely that it has objective value. Marshall himself does not make this distinction but if we follow his reasoning, it does tend to point towards different interpretations. Some of his arguments, like those we examined in the previous section, try to directly establish moral duties. Other arguments try to establish moral duties via the establishment of objective value. Rolston (1986) is another proponent of intrinsic value for Mars as well as other planets and abiotic phenomena and who reason along similar lines, while Cockell and Honeck (2006) are more careful and just leave the door open to the possibility that Mars has intrinsic value in the sense that it has objective value.

One of Marshall’s arguments goes as follows: “Although it [i.e. Mars] might seem to be a great useless hunk of red rock to us, humans could, in the view of martian rocks, be merely living organisms who are yet to attain the blissful state of satori only afforded to non-living entities.” (Marshall 1993).

It is hard to know exactly what is meant by this. Marshall does not seem to think that rocks are conscious, so a literal interpretation would not do justice to the argument. A more realistic interpretation would be that not being alive can also be a

state that has value in itself, even though it cannot be experienced. Neither can it be fairly judged by us living beings.

Based on Marshall's text, it is impossible to know for sure if this is the correct interpretation but it is the most reasonable I have managed to come up with. Unfortunately, it is still not convincing enough, however. The big hole in the argument seems to be in the leap from the fact that we cannot know that a state of nonliving does not have objective value, to accepting that we should assume that it does and let that assumption determine how we should act.

This actually points straight at two major, and seemingly insurmountable problems with basing moral obligations on assertions of objective value. There does not seem to be any way of determining what has objective value or why. Therefore, we have no good answer to how objective values can entail moral duties, or what these duties would be.

Rolston (1986) provides many good reasons to value geological features, including lifeless planets. He writes "... they are recognizably different from their backgrounds and surroundings. They may have striking particularity, symmetry, harmony, grace, spatiotemporal unity and continuity, historical identity, story, even though they are also diffuse, partial, broken." There are several passages similar to this one where he depicts non-biotic nature in very poetic terms. He also—like Marshall—points out that the abiotic nature is active in its own right, but while Marshall uses this as an argument in favour of moral standing, Rolston argues that this is another reason to value it (Rolston 1986). It is easy, when reading this, to see that there are good reasons to attach value to these phenomena. It is not easy, however, to see how this value is independent of a valuer. Rolston does a very good job in showing how the phenomena he describes fit in our normal sense of beauty, awe, etcetera, but how would the features he describes using human language fare if there were no humans with our particular sense of value? It seems impossible to know the answer to that question and therefore also to answer the general question what has objective value and why. This also makes it difficult to answer the corollary question of why this would lay any moral duties on us.

Marshall's other main argument in favour of objective value for an uninhabited Mars is inspired by Rolston (1986). They both agree that we should appreciate nonliving worlds for what they are instead of 'depreciating' them for not harbouring life (Marshall 1993). He finishes by saying that "In reality they have not 'failed' to be anything; they have achieved being what they are. We must not consider Mars or any other celestial body to be unlucky just because it does not support life. Indeed, even in the absence of an indigenous lifeform, Mars possesses its own uniqueness and diversity which are worthy of respect." (Marshall 1993).

Like with Rolston's poetic description above, Marshall's argument presents very good reasons for us sentient beings with emotions that answer to properties like those Marshall mentions, to value Mars as an end in itself, even without life. The question that remains to be answered is also the same as with Rolston: how do we know that Mars has value even if we were to fail to appreciate it, and if it does, why would that entail any moral duties on us?

Marshall (1993) also argues that “It is evident that geologists can admire and wish to preserve the pristine nature of geological structures, just as a biologist would wish to preserve a living forest or coral reef.” This is, again, a good example of a subjective value. This does not have to mean that this argument, or the previous ones, are not useful in our investigation (we will get back to the question of subjective values in the next section). It just means, it is not a good argument for objective value.

The question of whether any objective value of an uninhabited Mars confers any moral duties on us to preserve it that way is interesting in its own right and will, of course, be very relevant if anyone manages to figure out a way of determining what has objective value. It is usually assumed by those who refer to objective values that if something has objective value, then we have to be morally obligated to protect it. I think, however, that there are good reasons to question that assumption.

In the previous section, we noted that interests seem to be necessary for moral standing. This means that no matter how much objective value something has if it does not have any interests of its own and does not matter to anyone with interests (that is if it does not have subjective value), it cannot generate any moral duties. This, in turn, means that the possible existence of objective value on Mars or anywhere else is ethically irrelevant.

Let us try to imagine what it would mean by imagining something that is typically not valued by valuers today and imagine that it instead has objective value and that this value generates moral duties. Let us say, for instance, that putting things on top of other things (courtesy of Monty Python) has such value. It may seem like a silly example but remember that we do not know what has objective value, and we need to assume that it is different from the more well-known subjective values, so we will not confuse the matter by subconsciously projecting our subjective values on the phenomenon we are investigating. According to the argument, the objective value of putting things on top of other things would generate a moral duty to put things on top of other things. Does this seem reasonable? I suppose a possible explanation to why it does not is that we as valuers are biased in favour of things we value today. This is certainly possible, even plausible, but I must still confess that if we sometime in the future manage to determine that some things do have objective value, and realise that these things differ from what has subjective value to sentient beings (that is to beings who can actually suffer or rejoice based on whether the things they value are promoted/preserved or not) and we at least in some instances have to choose between protecting or promoting objective values that do not matter to any sentient being, and protecting or promoting some competing subjective value, the preservation or promotion of which, brings joy or mitigates suffering among sentient beings, then I for one would go for the subjective value every time. I would, in fact, consider it quite immoral to do otherwise.

Let us not give up yet, however. I mentioned Monty Python’s example of putting things on top of other things because it is a clear example of something that is not valuable from the subjective perspective of most readers, but maybe there are better examples?

If someone decided to strip mine Mount Everest, the highest mountain on Earth, it would probably evoke quite a lot of protests. This can of course easily be explained

by the subjective value it has in the minds of the protesters, but what about Olympus Mons? Olympus Mons is the largest mountain on Mars as well as in our solar system. If we assume, as we do in this chapter, that Mars is lifeless, then does not that mean that since no one is there to value it, it must lack subjective value? Does it not at the same time, seem rather odd that Mount Everest deserves to be protected because of its exceptional stature, while a mountain that is three times as high on another planet does not?

This would seem like a good case for claiming that some objects do deserve respect even though they are not valued by any sentient being, and they are not sentient beings themselves. We have to remember, however, that even though there is no one (we assume) on Mars to value it, we are still talking about it being threatened by strip-mining. This can only be the case because we humans on Earth know about this mountain. We know that it exists, we know how high it is, we know at least a bit about its geological history, and we can in fact even see it through telescopes and in photographs taken through telescopes and by instruments in orbit around the planet. Saying that it cannot have subjective value because Mars is uninhabited is therefore not completely true. It can still be valued subjectively by us Earthlings.

So, what about an object on some planet around another star that we can still not observe and do not know anything about. Cannot that object have value in such a way as to generate moral duties? If strip-mining Mount Everest and Olympus Mons would be bad, would it not be even worse if something happens to another mountain even higher and more majestic than Olympus Mons on another planet around another star?

If we agree that it would, it is because we as sentient beings have formed the concept of a mountain that is higher and more majestic than Olympus Mons and because we have also formed an abstract principle of high and majestic mountains having value, which still makes it highly doubtful that this example can be used as evidence of objective value. There is also another problem with this example. Even if we did assume that an extrasolar mountain that is higher than any mountain in our solar system would have objective value, and even if it was threatened by some strip-mining project, there is no way we can do anything about it. We can therefore not have a moral obligation to protect it (as long as we accept that ought implies can). This is not just for the contingent reason that it will be very far away, and we have yet to invent warp-drive (courtesy of Star Trek). In this particular case, there is an even more compelling reason, namely that the very basis for this thought experiment



was that we are not aware of this mountain. If we were, the basis for concluding that the value of the mountain is not subjective would fail for the same reason as with Olympus Mons.

## 12.5 The Subjective End Value of a Pristine Mars

The first interpretation of ‘intrinsic value’ in the list says that an uninhabited Mars can have value as an end in itself. This concept is compatible with the idea of objective value as well as with an idea of subjective value. When we discussed the idea that an uninhabited Mars has objective value, it was assumed that we were talking about end value. The concept of end value is, however, equally compatible with the idea that an uninhabited Mars has subjective value. In that case, the claim is that there are people who simply value Mars the way it is even if (or because) there is no life and that the rest of us have an obligation to take that into consideration when deciding what to do with Mars.

Here we need to ask two questions: 1. Is it reasonable to assume that an uninhabited Mars can have value as an end to sentient beings on another planet (that is Earth)? 2. Can such values if they exist generate any moral duties?

We have in fact already established a positive answer to the first question through our discussion about Olympus Mons above. Both Rolston’s (1986) and Marshall’s (1993) arguments for why an uninhabited Mars has objective value, were found to fit much better with the notion that they have subjective value, at least to the authors, but probably also for others who share the emotions the authors expressed in the text.

When it comes to end value, it seems, in fact, quite irrelevant whether the valuer and the valued are residing on the same planet or not. End value is the kind of value something has because it is valued in its own right independently of whether it can be used to achieve some other value. Even if no human will ever visit Olympus Mons and even if we will never be able to use it for anything, mining, tourism, sport, or anything else, it can still have value to us by just standing there and be tall and majestic. The same must be true for other features on Mars, as well as for the planet itself.

Through the reasoning in the previous section we also, partly, answered the second question, whether subjective end values can generate moral duties. We established in that section that things that have value subjectively to sentient beings are the only things that can generate moral duties. This also means that if we accept that there is such a thing as moral duties, these duties have to be generated by things having subjective value to sentient beings.

Does this mean that since some people attach end value to Mars in its uninhabited state, we have to leave the planet in that state? The answer to that question is no. Just as there are people who value Mars in a lifeless state, there are those who find great value in making Mars come alive and there is no reason why not this too is a legitimate end value.

The obvious question would then be, what are we morally obliged to do, knowing that people value completely opposite states? Does not this mean that grounding moral duties in subjective values is in fact impossible?

If it was the case that as soon as someone subjectively values something for its own sake, then we all have a duty to preserve or promote that thing, then we would end up in an impossible situation in all cases where people have opposing values. Luckily, there is no reason to go as far as saying that all subjective end values generate absolute duties to promote or preserve them. The reasonable approach is instead to acknowledge that we are morally obliged to consider these values and attach due weight to them when we make decisions.

So, how are we to do that? If it was possible to base moral duties on objective value and if it was possible to identify objective values, we would not have this problem. We would ‘just’ have to ask ourselves, who is right? Unfortunately, as we saw in the previous section, this is not an option.

The option that is advocated by utilitarianism tells us that even though the values at stake are subjective, it is still possible to find a true, objective, answer to the question of what our moral duty is, namely by counting the number of people holding respective value and determining the strength of the values to those who hold them. It is usually practically impossible to do this with a particularly high degree of precision, but it may be possible to provide reasonable approximative answers.

Another way of dealing with the dilemma would be to acknowledge that there is no objectively true answer and sit down and talk with the aim of finding a compromise that those with an interest in the matter at least can live with even if it is not ideal. This approach may lack the theoretical attractiveness of finding objectively true answers, either to what is of value or to how to transform subjective values into objective duties. Contrary to these approaches, however, it may actually work, which I think, may be at least as attractive. One outcome of such an approach could be a compromise in the form of the establishment of a set of protected areas (suggested by among others Cockell and Honeck 2004, 2006 and Rolston 1986).

## 12.6 The Instrumental Value of a Pristine Mars

We noted above that if it was possible to identify and base moral duties on objective values, it would be much easier to handle value conflicts. We also found that the prospect of doing that seems bleak, but maybe we, despite our efforts above, have not totally exhausted the possibilities? Let us give objective values one more try.

Let us start with another thought experiment, this time with a very simple and down to Earth one. Let us imagine a 2-year old human who really hates eating. She is clearly a sentient being and she clearly assigns a negative value to eating. To her, eating has a very strict negative subjective value. As an adult, I know that eating is, in fact, necessary for one’s survival, whether one likes it or not, and as a responsible parent, I use every trick in the book to make the 2-year old eat, despite her very clear and, very clearly stated, preference to the contrary.

Is not this a good illustration of a case of something, namely eating, that has objective value in the sense that it has value whether one likes it or not, and is not life, in fact, full of cases like this? Some tools are objectively, measurably better for performing a certain function than other tools whether we like them better or not. Some football players are just better than others at scoring and this can be found out objectively just by looking at the scoreboard.

We can with ease find an almost unlimited number of examples like this and they are all good solid illustrations of the fact that there are, indeed, identifiable objective values—in a way. We can also with ease find examples of how these cases generate moral duties. If someone is sick and you are a physician, it seems obvious that you have a moral duty to use methods and equipment that is objectively better at curing this disease, at least as long as they are available and as long as it does not conflict with other moral duties.

It thus seems that we have, finally, found a way in which values can be objective and in which these values do create moral duties. There is one thing we have to notice, however. In addition to being objectively determinable, all the values mentioned in this section so far also have one other thing in common. They are examples of phenomena that are only valuable in so far as they can produce a result that is subjectively valuable. Eating and curing diseases are valuable only to the extent that we value life, or the things continued living can give. The football player is good at scoring, which is only good if we root for her team. This may seem too obvious to point out, but it is easily overlooked, and it is important. The values we discussed in previous sections were end values. All the values we have referred to here, are instrumental values. We have thus left the realm of so-called ‘intrinsic values’. This does not necessarily have to be a problem, but it does have some repercussions that need to be pointed out. Strictly speaking, only end values are in some sense ‘real’ values. Stating that something has instrumental value is just a convenient way of stating a belief (that may or may not be true) that something tends to promote or preserve something else that has value. This, in turn, has the practical implication that we are only morally obligated to promote or preserve instrumental values if they are important promoters or preservers of something else that we are morally obligated to preserve or promote because it has end value to sentient beings.

How does this help us understand our moral obligations regarding an uninhabited Mars? It does by clarifying that an uninhabited Mars may not only have end value to sentient beings whose interests we are morally obligated to consider. Keeping Mars lifeless might also have instrumental value in the sense that it helps us promote or protect something else that has end value to sentient beings, and that do not necessarily have to do with Mars.

How then can keeping Mars uninhabited be instrumentally valuable to us earthlings? Billings (2006) points out that putting humans on Mars will affect human society and culture on Earth. In the same paper, she warns about the attitude taken for granted that we should spread western consumerism into space. She also questions the American frontier metaphor that she claims is not even historically valid on Earth though it seems to be a very strong metaphor, frequently used to support a rather aggressive form of space colonialism (Billings 2006). Following this line

of thought, we can see that abstaining from treating Mars as a frontier to be conquered or colonised, or as a resource to be exploited in order to uphold a consumerist lifestyle, could be seen as a moral duty based on the value of not upholding a flawed lifestyle and a set of flawed attitudes that have a negative instrumental value to most of us (whether we realise it or not) by destroying things with end value on our own planet. If abstaining from colonising Mars can help curbing these habits on Earth is an empirical question that is outside of the scope of this chapter, though it does not seem completely implausible.

A rather speculative twist to the question of instrumental value is the idea that uninhabited worlds should be left alone for the sake of future life that may evolve on the planet. Green (2014) points out that Immanuel Kant seems to have been of the opinion that we do have such a duty. Green does not believe that this is a strong argument for leaving Mars alone, however, since he does not believe that the prospects for life to evolve on Mars without help from Earth are very bright. As Green also points out, Kant was a proponent of the view that only intelligent life has moral status. Since the probability that intelligent life will evolve on Mars ought reasonably to be even smaller than the probability that any life will evolve on the planet, this makes it even less meaningful from a Kantian perspective to impose a moral duty on us to preserve the planet in its pristine state. A more plausible account of what it takes to have moral status, that draws the line at sentience rather than intelligence, would, of course, increase the probabilities somewhat, but the actual probability would still be negligible.

One interesting twist that seems to present itself here is whether Kant's view cannot be used more successfully as an argument in favour of increasing the probability that life will evolve on the planet by altering the conditions of the planet, so they become more similar to those on Earth at the time life first appeared here—or even seed the planet with Earth life.

Green does not discuss this question and since it falls outside the scope of this chapter, I will not delve into it either, other than by noting that Kantian ethics normally consider negative duties to be much stronger than positive duties, which in this case reasonably would favour leaving the planet alone over altering or seeding it.

One of Marshall's (1993) arguments for the objective value of Mars is 'Even if a planet appears undynamic or dead it may preserve in its rocks and minerals things which represent millions, or even billions of years of past dynamic processes. It may also preserve past histories of life in the form of fossils.' Marshall means this as an example of an objective end value. As noticed above, however, we have no way of assessing whether representing billions of years of dynamic processes really is an objective end value, though it is not unreasonable to assume that it does represent a subjective end value to some. It is, however, also an excellent example of instrumental value. By preserving traces of geological dynamic processes, a lifeless Mars can be very useful for science. On Earth, the geological processes are intertwined by biological processes. If Mars is uninhabited, it will provide opportunities to study pure geological processes, which means an uninhabited Mars has instrumental value in relation to science and as a result of that, to knowledge. Both science and the resulting knowledge are examples of things that can have both end value and instrumental

value in relation to other values that can be promoted or preserved by the help of knowledge.

On the other hand, if we choose to seed Mars with Earth life or terraform and colonise Mars, science will have the opportunity to see how life, and eventually society, will evolve on another world. This too will create knowledge that may have end value and/or instrumental value. Instrumental values are thus objective in the sense that some are identifiably better at promoting and preserving end values than others no matter what we happen to think about them. On the other hand, something's status as and degree of instrumental value depends ultimately on the end values they preserve or promote. This, in turn, means that if, and to what strength, they generate any moral obligations, also depends on the subjective end value they ultimately promote or protect.

This means that this last attempt to find objective value that can help us determine once and for all whether we have a moral duty to preserve Mars in its pristine (presumably) lifeless state did not get us all the way but provided instead another class of values that we have to consider.

Whether the examples we have seen in this section, or any other instrumental value an uninhabited Mars may have, provide a moral obligation to preserve Mars in its pristine, lifeless state depends, as we have seen, ultimately on the subjective end values that these instrumental values preserve or promote, as well as how important they are for preserving or promoting these end values. It depends also on how we prioritise or compromise in the face of opposing end values.

## 12.7 Conclusions

If Mars does not harbour any indigenous life, do we have any moral obligations to keep it that way?

We have not found any unambiguous or straightforward answer to the question, but we have managed to straighten out several questions surrounding this big question. One thing we have found is that the planet Mars does not in itself have any 'say' in this matter. Non-sentient entities, like planets, whether they harbour life or not, do not have a moral status. We, therefore, do not have any moral obligations to the planet itself to keep it in its pristine, lifeless state.

We also found that we cannot settle the matter by referring to objective end values. Even if they exist, there is no way of identifying them in a way that clearly set them apart from subjective values. It is also not possible to base any moral obligations on objective end values. Since we can only have moral obligations towards sentient beings, we can only have moral obligations regarding things that are valued by sentient beings, that is, regarding subjective end values.

We did find some plausible ways in which an uninhabited Mars may have end value to some sentient beings (most plausibly humans on planet Earth). This does not necessarily mean that we have a moral obligation to leave Mars in that state, however. We know that some people think that spreading life to Mars would have

end value. How to handle this value conflict lays beyond this investigation. We can merely notice that there may be different ways of doing that. A utilitarian would go about this task by trying to determine the number of people on each side and to assess the relative strength of the competing values to the valuers. Others have suggested a compromise in the form of leaving some parts of Mars in its pristine state while colonising other parts.

There is one type of objective values that are relevant to our investigation, namely instrumental values. They are objective in the sense that it is at least in principle possible to objectively determine whether something is better than something else at promoting or preserving a certain end value. Ultimately, however, whether something has instrumental value and how much, depends on the subjective end value it promotes or protects.

We did manage to identify some plausible ways in which it may have instrumental value to leave Mars uninhabited. Whether that is enough to generate any definitive moral obligation to leave Mars that way, depends ultimately on how we prioritise between the end values these instrumental values promote or protect and other end values including the positive or negative valuation of an uninhabited Mars in itself.

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