

# Critical reflections on astronomy and development. The case of the Square Kilometre Array (SKA) radio telescope project in South Africa

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Perhaps one of the most remarkable features about the Square Kilometre Array (SKA) project, when completed the world's largest radio telescope, is that its main host site is located in Africa. When I began my sociological study of the semi-arid Karoo region of South Africa in 2016 where recently the South African SKA precursor MeerKAT has been inaugurated, I thought this enabled a reversal: for the first time in history Africa was going to be represented for what it is, and will eventually become, rather than for what it is not, or has not yet achieved, as many analysts depict the continent's developmental trajectory. I was therefore very intrigued to hear first hand how people in the small towns around the telescope viewed such a significant endeavour, expected to answer some of the most fundamental questions about the past and the future of humanity. Even more surprising was to realize soon after I started spending time in Carnarvon, the most prominent of these small towns, that for many people the SKA was a highly controversial issue, raising a number of concerns and public critiques. This backlash has been despite the fact that the South African SKA, now SARA0, runs a significant number of local development initiatives across different fields, including education, the upgrading of infrastructure, and support to local businesses.

To explain why the SKA became a controversial topic I will briefly explore two key moments illuminating the complex relationship between the SKA and Carnarvon. The underlying argument is that the 'development of astronomy' the undertaking of astronomy for scientific progress – and 'astronomy for development' – the societal impact resulting from the undertaking of astronomy – are two propositions reflecting priorities that are not always aligned and, for this reason, need careful examination. The first phase of this interaction dates back to the early 2000s when the intention to build the two SKA precursors (KAT-7 and then MeerKAT) was first announced. This was a moment in time characterised by the setting of high expectations about what the project could deliver for the small towns around the core site. This moment culminated in 2012 when South Africa won the international bid to host the broader international SKA project. Inter alia, then President Zuma visited Carnarvon, an exceptional event for local people, and declared that the "SKA will put Carnarvon on the world map". Local people were excited and honoured by the opportunities that would seemingly arise from the project. All this took place in a context characterised by significant marginality and social challenges. Small towns in this region of South Africa are characterised by high unemployment and school

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dropout rates, dependence on government social grants, and significant substance abuse. These towns are still characterised by strongly racialised social hierarchies, a legacy of the apartheid period, involving a tiny, relatively wealthy white elite and a large underclass of impoverished “coloured” people. In this context, the SKA seemed to constitute a once-in-a-lifetime opportunity to change the course of a history of marginality. Effectively, it represented an opportunity to make, not remain outside of, history. This was also seen as fulfilling the promises of the post-apartheid transition, in particular the values of pan-Africanist humanism of the African Renaissance proposed by President Mbeki in his term in office (1999 – 2008).

However, soon afterwards a second and more turbulent phase opened in the relationship between Carnarvon residents and the SKA. Relationships started deteriorating from 2016, when the SKA implemented a land acquisition programme for the core site of the infrastructure. The acquisition programme was in line with the regulations set by the 2007 Astronomy Geographic Advantage Act that provides the Minister of Science and Technology with special powers to prioritize astronomy in the region, primarily to minimize radio frequency interference around the telescope. Initially, protests came from the white commercial farmers who owned the farms that were being bought, notwithstanding the payment to them of generous compensation. Later, protests extended to important segments of the ‘coloured’ majority. Key concerns they expressed included their lack of involvement in local decision-making processes, questions about the distribution of resources for local development, and the lack of transparency in communications between the community and project management. Assessing the validity of these claims is a complex task that is beyond the scope of this short article. But what is important to stress here is another paradox. Most complaints about the SKA come from Carnarvon which is also the local town that has received the lion’s share of development support. The way in which anti-SKA sentiment has unfolded suggests two complementary readings. Firstly, it is how the initially high local expectations of the project have unfolded over time in a very marginalised context. Secondly, it is how the expectations intersect with historically rooted concerns around land and forge the ways in which people relate to each other and to external interventions. Another important aspect is that while from the perspective of the SKA project the Karoo is often portrayed as a desert region ripe for new developments serving the future of South Africa and humanity at large, it is certainly not unpopulated, even if it is sparsely populated region. Current concerns that people raise about the major shift from farming to astronomy intersect with a long and complex history of land dispossession in the region; they also overlap with other land use changes, including renewable energy, mining, and conservation. This complexity generates considerable anxiety in people about their individual futures and the future of the region.

Two main lessons that can be drawn from this case study are firstly, that the two propositions ‘development of astronomy’ and ‘astronomy for development’ are not neatly aligned, and secondly, that by implication we need to unpack what we mean by ‘development’. Can large astronomy projects that are about the advancement of science be simultaneously about science for development? Who should take responsibility for delivering on the promises of astronomy for development? What does science for the benefit of humanity mean when we narrow our focus to a small town in the Karoo? The case of Carnarvon suggests that the relationship between astronomy for development and the development of astronomy is much more complex than it appears at first glance. There is a disconnect between the national and global benefits that are set to flow from the investment in astronomy and its local development impacts. Policy-makers need to take this disconnect seriously by designing policy options and possible mitigation mechanisms for those who stand to lose the most.