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## Sequestration of atmospheric carbon dioxide as inorganic carbon in the unsaturated zone of semi-arid forests

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We propose tackling CO<sub>2</sub> reduction using an economical and sustainable, low-tech method to reverse the secondary processes of deforestation, specifically in semi-arid regions. These areas, which comprise ~17% of the global land area, are characterized by erratic and low amounts (25-70 cm/yr) of precipitation, enough to support small trees. The Yatir forest in Israel is an example of reforestation in a semi-arid zone. The forest's trees act as pumps, taking in CO<sub>2</sub> through stomatal apertures in their leaves, and then pumping out CO<sub>2</sub> through root respiration underground into the thick water unsaturated zone (USZ). HCO<sub>3</sub><sup>-</sup> bicarbonate in the resulting USZ aqueous solution interacts with soil minerals to form and then precipitate a variety of secondary carbonate salts. Radiocarbon dating proves that this sequestration is long term. Consider a volume in the USZ of this forest (1 square km area, 6 m depth). Our measurements show that the carbonate salt precipitation within this volume of sediment is approximately equivalent to 37.8 tons CO<sub>2</sub> per year. The world's semi-arid zones cover approximately 23. million square km. Taking Yatir forest data to be representative, our very rough potential global CO<sub>2</sub> annual sequestration rate estimate in the world's (to be planted) semi-arid forests is then ~1 billion tons CO<sub>2</sub>/yr, precipitated as inorganic carbonate salts within the USZ. This value represents ~5% of the 20 billion tons CO<sub>2</sub>/yr rate by which the CO<sub>2</sub> in the atmosphere is currently increasing. Our estimates should be checked and refined by extending the Yatir forest studies to other semi-arid regions.

### Biography

Murray Moinester is an Emeritus Professor of Physics. He received his PhD from the University of Rochester in 1968 and then joined the faculty at Tel Aviv University. He served as guest Professor for extended periods at many leading universities and accelerator laboratories. He has extensive experience in experimental and computational methods. He carried out many research programs in high energy particle and nuclear physics. He published some 200 scientific papers in refereed journals, authored some 75 conference papers; worked as a patent writer, in the field of Archaeology on infrared imaging & scientific dating, on statistics analysis for the social sciences, and on climate engineering.

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