During the late austral spring of 2009 we carried out experiments (4 days of duration) with four cyanobacteria species, *Anabaena* sp*., Nostoc* sp*.*, *Arthrospira platensis* and *Microcystis* sp., to assess the combined effects of temperature and solar radiation on photosynthesis performance and morphology. Two experimental temperatures (18 °C and 23 °C, simulating a 5 °C increase under a scenario of climate change) and three radiation treatments (by using different filters/materials) were implemented: (*i*) P (PAR, 400–700 nm), (*ii*) PA (PAR + UV-A, 320–700 nm) and, (*iii*) PAB (PAR + UV-A + UV-B, 280–700 nm). In general, samples under the P treatment had less decrease/higher recovery rates of effective photochemical quantum yield (*Y*) than those receiving UV-A or UV-A + UV-B. The effects of increased temperature were species-specific: At the end of the experiments, it was seen that increased temperature benefited photosynthetic performance of *Anabaena* sp*.* and *Nostoc* sp. but not of *Microcystis* sp*.* and *A. platensis*. Higher temperature was also associated to an increase in the chain area of *Anabaena* sp., and to bigger trichomes in *A. platensis*; however, no morphological effects were observed in *Microcystis* sp. In addition, in *Nostoc* sp. the increase in temperature counteracted the UVR impact on the reduction of the chain area. How these effects and mechanisms will affect the trophodynamics and production of aquatic ecosystems is still uncertain, but the specificity of the responses suggests that not all cyanobacteria would be equally benefited by temperature increases therefore affecting the balance and interaction among species in the water column.