Global constraints are an essential component in the efficiency of centralized constraint programming. We propose to include global constraints in distributed constraint satisfaction and optimization problems (DisCSPs and DCOPs). We detail how this inclusion can be done, considering different representations for global constraints (direct, nested, binary). We explore the relation of global constraints with local consistency (both in the hard and soft cases), in particular for generalized arc consistency (GAC). We provide experimental evidence of the benefits of global constraints on several benchmarks, both for distributed constraint satisfaction and for distributed constraint optimization.