Under the applied current magnetic vortices move and dissipate the energy driving a superconductor into a resistive state. We demonstrate experimentally and theoretically that confining vortices within the narrow superconducting constrictions with the characteristic dimensions comparable to the size of the vortex core, one can reverse the detrimental effect of the magnetic field and recover superconductivity. We investigate two different exemplary systems, the superconducting wire and the thin superconducting film patterned into a regular array of nanoholes, and observe the drop of the resistance by several orders of magnitude to immeasurably small in a wide range of magnetic fields and temperatures. We show that the mechanism behind the magnetic field-induced superconductivity is the combined action of merging of the densely packed constricted Abrikosov vortices into large immobile hypervortices and the effects of surface superconductivity. We develop a quantitative theory of reentrant superconductivity in superconducting strips in terms of the phase-slip concept and show that the experimentally observed non-monotonic phase slips related magnetoresistance results from the existence of the longitudinal order parameter instability near the transition between the vortex-free and vortex states in a superconducting strip. We propose a quantitative description of the resistance of the wires and films and demonstrate that theoretical results favorably compare with the experiment.