Localizing dynamically changing diffuse event sources in real environments is still an open problem in Wireless Sensor Networks (WSN). The dynamism of the environment, the energy limitations of the sensors, and the noise associated to the sensors' measurements pose a challenge that a realistic solution has to deal with. In this paper we propose a decentralized approach to detect diffuse event sources in dynamic and noisy environments, using a Wireless Sensor Network infrastructure. Our approach is gradient-based and follows a distributed and decentralised algorithm based on local interactions and local knowledge of the environment. Reported experiments show that our approach efficiently adapts in tracking the event sources as they appear, is scalable and robust to noise and failures.