# STATUS AND PROTECTION OF REGULATING ECOSYSTEM SERVICES IN CITARUM RIVER, WEST JAVA, INDONESIA

**Desty Pratiwi**

**Pembimbing:**

**Prof. Sunardi, Ph.D**

**Dr. Dadan Sumiarsa, M.Si**

## ABSTRACT

Self-purification is a regulating ecosystem service responsible for river water quality from pollutant inputs. The Citarum River, the longest river in West Java, is a national strategic river that fulfills the water needs of the people of West Java and Jakarta. However, water quality has declined due to pollutant inputs from domestic and non-domestic activities. This study will investigate the water quality, self-purification status, and heavy metal contaminants in the upstream Citarum River in the Cihawuk Segment. Afterward, management strategies for self-purification ecosystem services in the Citarum River will be formulated. Investigation of self-purification using deoxygenation and reaeration values. Determination of deoxygenation coefficient value using laboratory (Slope method) and empirical (Hydroscience) while reaeration coefficient (O'Connor & Dobbins). The results of calculations and analysis show the value of the laboratory deoxygenation coefficient (k1) of 0.042 $d^{-1}$ and empirical deoxygenation (k1') of 1.128 $d^{-1}$ with an ultimate BOD value (Lo) of 182.1 mg/l. Meanwhile, the reaeration coefficient (k2) was 0.193 $d^{-1}$. The overall water quality has passed the class 2 water quality standard. Measurement of heavy metal contaminants shows heavy metals such as Pb, Zn, Mn, Mg, Ni, and Fe. Based on the deoxygenation and reaeration values, the self-purification status of the Citarum River in the Cihawuk Segment is low. The reason may be that the presence of factors such as heavy metals, pesticides, phenols, and surfactants that interfere with the decomposition process of organic matter can influence the self-purification ability. The management strategy related to self-purification is the improvement of the Citarum Harum Action Plan (Renaksi), such as water quality monitoring with additional measurement sites and parameters, centralized command direction, and improvement of the command center function to be more transparent and detailed regarding Citarum River data, and applied technologies to support quality water.

# STATUS DAN PERLINDUNGAN LAYANAN EKOSISTEM PENGATURAN (*REGULATING ECOSYSTEM SERVICES*) SUNGAI CITARUM (HULU), JAWA BARAT

**Desty Pratiwi**

**Pembimbing:**

**Prof. Sunardi, Ph.D**

**Dr. Dadan Sumiarsa, M.Si**

## ABSTRAK

*Self-purification* merupakan layanan ekosistem pengaturan yang bertanggung jawab dalam kualitas air sungai dari masukan pencemar. Sungai Citarum sebagai sungai terpanjang di Jawa Barat menjadi sungai strategis nasional yang memenuhi kebutuhan air untuk masyarakat Jawa Barat dan Jakarta. Namun, kualitas air menurun dikarenakan masukan polutan dari aktivitas domestik dan non domestik. Penelitian ini akan mengivestigasi kualitas air, status *self-purification*, kontaminan logam berat pada Sungai Citarum hulu pada Segmen Cihawuk. Setelah itu, dilakukan perumusan strategi pengelolaan terkait layanan ekosistem *self-purification* pada Sungai Citarum. Investigasi *self-purification* menggunakan dari nilai deoksigenasi dan rearasi. Penentuan nilai koefisien deoksigenasi menggunakan pendekatan laboratorium (Slope method) dan empiris (Hydroscience) sementara koefisien reaerasi (O'Connor &Dobbins). Hasil perhitungan dan analisis menunjukkan nilai koefisien deoksigenasi (k1) laboratorium 0.042 $d^{-1}$ dan deoksigenasi (k1') empiris sebesar 1.128 $d^{-1}$ dengan nilai BOD ultimate (Lo) sebesar 182.1 mg/l. Sementara, nilai koefisien reaerasi (k2) sebesar 0.193 $d^{-1}$. Kualitas air secara keseluruhan menunjukkan sudah melewati baku mutu kualitas air kelas 2. Pengukuran kontaminan logam berat menunjukkan logam berat seperti Pb, Zn, Mn, Mg, Ni, Fe. Berdasarkan nilai deoksigenasi dan reaerasi status *self-purification* Sungai Citarum pada Segmen Cihawuk yakni rendah. Alasannya kemungkinan adanya faktor seperti logam berat, pestisida, fenol, surfaktan yang mengganggu proses dekomposisi dari bahan organik sehingga mempengaruhi kemampuan *self-purification*. Strategi pengelolaan terkait *self-purification* yaitu peningkatan dari Rencana Aksi Citarum Harum seperti monitoring kualitas air ditambah untuk tempat dan parameter pengukuran, dan peningkatan fungsi *command center* agar lebih transparan dan detail terkait data Sungai Citarum, dan menerapkan teknologi dalam mendukung kualitas air sungai.